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THE AUTOMOBILE

Gasoline Reigned During Elks' Week at Detroit

THE CADILLAC FLOAT WHICH WON THE GRAND SWEEPSTAKES IN THE PARADE

DETROIT, MICH., July 18—Gasoline reigned in Detroit last week. The supremacy of the gasoline motor was strikingly demonstrated on land and water and in the sky overhead. No other factor contributed so largely to the entertainment of the host of visiting Elks. What with speed exhibitions by some of the word's famous drivers, aeroplane flights at the State fair grounds, motor boat races on the river and one of the greatest auto parades the world has ever seen, the visitors must have been impressed.

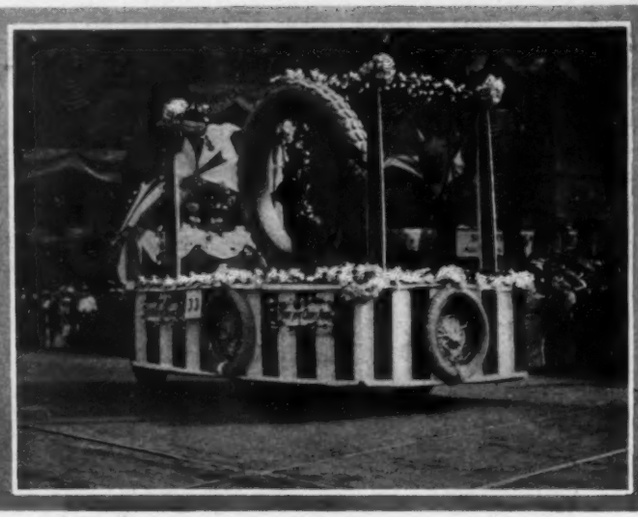
There were a few less than 2000 automobiles in line Friday afternoon. The parade was about a dozen miles in length and as a spectacle was well worth seeing. The entire route, traversing nearly eight miles, was lined with spectators and a goodly crowd filled the grandstands on Washington boulevard.

Practically all the local manufacturers took advantage of this opportunity and most of them made a creditable showing. An unusual number of 1911 models were displayed, high officials of the various companies driving them in many instances. There were some 40 sections in all.

The Cadillac Motor Car Company captured the grand sweepstakes prize, a 30-inch silver loving cup with gold lining, with its magnificent float representing Chevalier Cadillac receiving from Louis XIV. of France a commission to found a colony at Detroit. It was a reproduction in life of a painting that hangs in the city hall and which was presented to the city by the French Government on the occasion of Detroit's bi-centennial celebration.

A Chalmers "30," driven by Mrs. R. D. Aldrich, won the prize offered for the best decorated car driven by a woman. In the gasoline pleasure car division, T. A. Belinger, in a Warren-Detroit, won the first prize; Will B. Wreford, local agent of the Columbia, the second, and the third went to the driver of a Sibley "20." In the commercial-car division the first prize went to the Welch-Detroit motor car for a strikingly realistic reproduction of a scene from the battle of "Bloody Run." The second prize went to a local furniture house, and the third to Morgan & Wright, whose float contained a boy in a swing suspended from the top of a huge tire.

Columbia, which captured second prize for gasolines



Morgan & Wright float in the commercial division

The parade brought out some surprises in the way of comic novelty, but none more original than that of the Michelin Tire Company, a pair of inflated rubber giants perched on a high pedestal. The figures assumed ludicrous positions as the car sped along, its locomotive whistle screeching incessantly. The Michelin company won a prize, and the only one in the comic section.

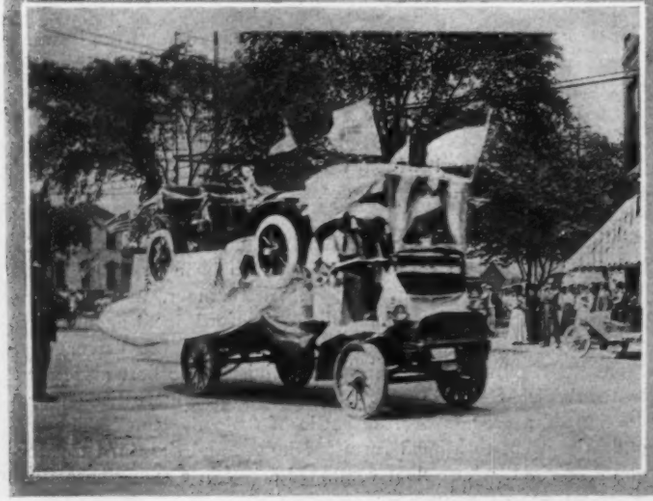
The Buick racing cars loomed conspicuously in the parade as they trailed along behind a car in which no less than 50 prize trophies were displayed. The official party, comprising Mayor Breitmeyer, Past Grand Exalted Ruler Sammis, of the Elks; Grand Secretary Fred C. Robinson, Grand Esquire A. J. Davis and Fred S. Burgess, chairman of the Elks' executive committee, rode in a Welch car at the head of the parade, directly behind the police escort in Fords. E-M-F cars made up four divisions and the Fords and the Hupmobiles two each. The Hudson Motor Car Company had about 60 cars in line. Robert K. Davis was marshal of the parade and rode in his purple and white Maxwell roadster, followed by his aids in their individual cars. The Regal "Plugger" was there with all its labels. "Garry" Herrmann, the new Grand Exalted Ruler of the Elks, rode in the Hudson "30" won by the Cincinnati ladies for making the best appearance in the big Elks' parade of Thursday.

Aside from its historical float and a fine showing of new cars, the Cadillac Motor Car Company displayed its enterprise by rounding up a half dozen or so of its earliest type, built in 1903, and having them driven in the parade by their owners under a banner bearing this legend: "Eight years of service and still going." The company says it has yet to hear of the first Cadillac car going out of commission.

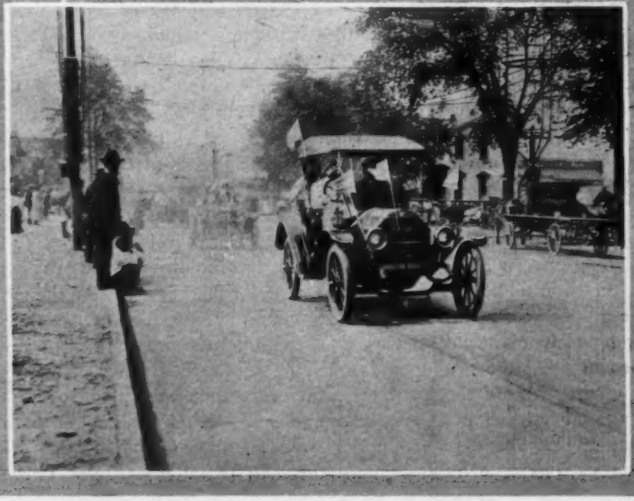
In spite of a rather heavy track, some remarkably good speed stunts were pulled off at the Grosse Pointe race track Saturday afternoon at the free exhibition matches participated in by the members of the Buick team. There were 12 events on the program, which attracted a crowd of nearly 10,000. The aeroplane flights at the fair grounds drew less than 1000 Saturday, but this attraction wasn't free.

Burman, in his special, made the fastest mile of the day in 56 4-5 seconds. This was on a second trial. The time on the first trial was 59 seconds flat. But Louis Chevrolet carried off the lion's share of the day's honors, winning every event in which he was entered but one.

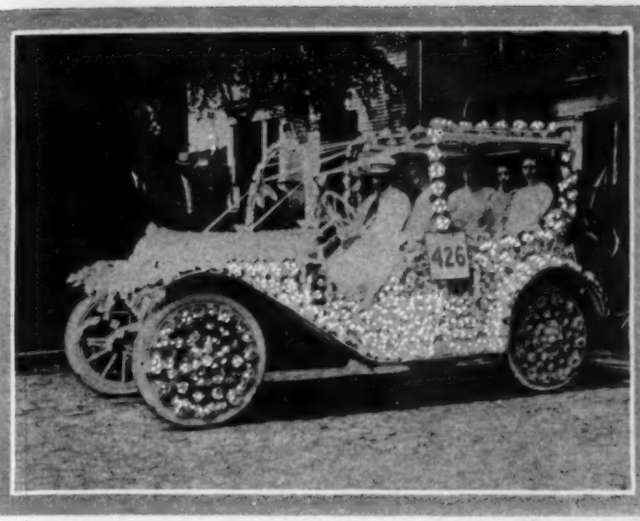
Both the General Motor Company's tented garage on the D. A. C. grounds and the United States Motor Company's "white city" out Jefferson avenue were put to good use by visiting motorists during the reunion, and the courtesy shown was greatly appreciated. The Sibley Motor Car Company also offered the use of its new building at Solvay and Mackey avenues to visiting motorists. The building is just completed and the company is moving in to-day.



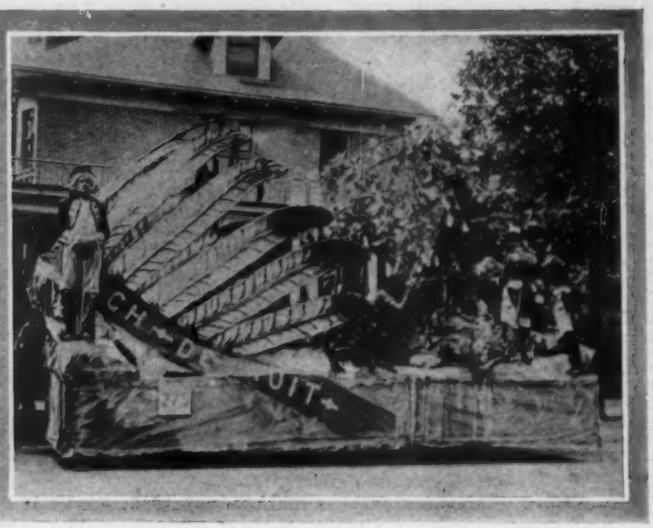
Regal "30" displayed to advantage on a truck



The Hudson showed up well in its class



Warren-Detroit, Winner of First Gasoline Prize



A Chalmers-Detroit float which attracted attention

The aeroplane flights at the State fair grounds Thursday, Friday and Saturday were the first exhibitions of the kind ever given in Detroit and were largely attended the opening day. Flights were made by Arch Hoxsey, Duval La Chappell and Walter Brookins, the latter of whom holds the world's altitude record, 6275 feet. No records were broken here and no attempt was made to break any, because of unfavorable conditions. While not aeroplaning, Mr. Hoxsey drove a Cartercar, placed at his disposal by George Reason, branch manager for the Cartercar company here. Between flights Leo Broker gave exhibitions with his "wind wagon," a cross between an aeroplane and a motor car, which proved as amusing as it was noisy. A race between the "wind wagon" and a motorcycle was an added feature of Friday's program, and the latter won by half a length in 1:41.2, going once around the mile course. The "wagon" is like an automobile in appearance, except for a huge propeller on the front end, which pulls the machine along when it revolves.

David Kerr, manager of the Kerr Machinery Company, has purchased the white and purple Maxwell roadster made especially for the use of Robert K. Davis, of the Maxwell-Briscoe-McLeod Company, during the Elks' reunion.

Walter E. Flanders, president of the E-M-F Company, emphatically denies a story that has gained wide circulation, that he is soon to leave the E-M-F to associate himself with E. LeRoy Pelletier, former advertising manager for the company, in the manufacture of a new style of automobile, propelled by four wheels turned by the motor instead of two.

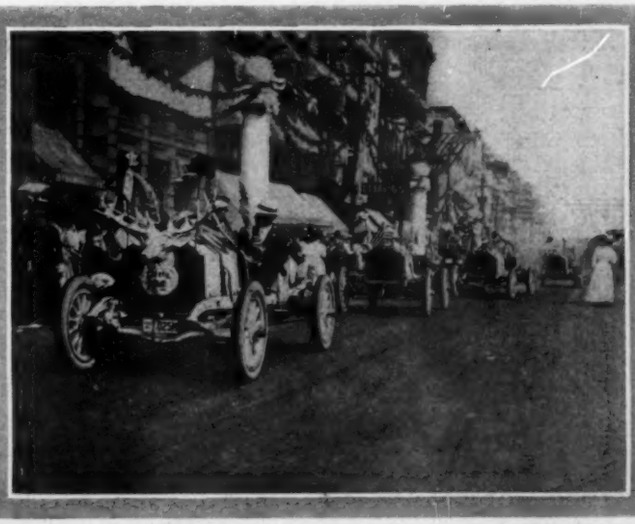
"The story," said Mr. Flanders, "is without the slightest foundation in fact."

Incidentally Mr. Flanders announces that the company has about completed plans for the manufacture of commercial trucks, which will necessitate the erection of another addition besides the two now under way.

Accompanied by a brass band, 500 employees, for the most part foremen and department heads, from the seven plants of the E-M-F company boarded a special train Friday morning for a day's outing at Lake Orion as guests of the company. This was a part of the three days' vacation given the men with full pay.

With reference to the resignation of Mr. Pelletier, the story comes from New York that J. P. Morgan, who now controls the E-M-F, was displeased with the prominence given his name in the press accounts of the sale and the publicity "dope" given out by Mr. Pelletier's department. It is reported that Mr. Pelletier's $200,000 worth of stock has been purchased by the Morgan interests at par.

After negotiations of long standing, James J. Brady has disposed of his interests in the Chalmers Motor Company to Hugh Chalmers, president of the concern. Previously he disposed of his interests in the Hudson Motor Company, the Metal Products Company and the Fairview Foundry Company.



Head of the parade coming down Woodward Avenue

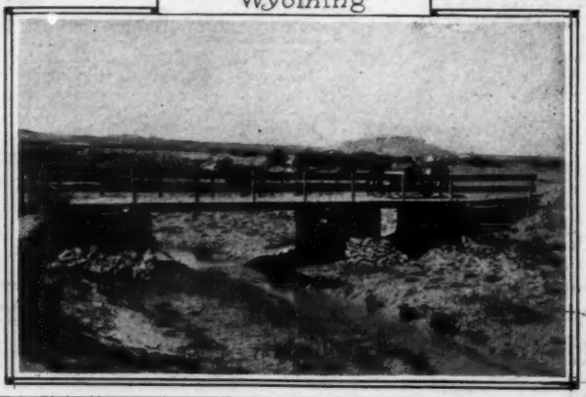
A particularly effective entry in the line-up

Through the Bitter Creek Section

Between Hanna and Rawlins

Sunset on Prairie

Bitter Creek Bridge Wyoming



Overland Transcontinentalists

WESTWARD from the Wyoming-Nebraska State line the route of the transcontinental trip following the old Overland trail lies through some mighty lonely country. The accompanying pictures show its desolateness with remarkable clarity, but they can give no idea of the quality of the roads in bad weather, for they were taken after a long dry spell when the alkali and baked mould were packed hard as flint under a thin cushion of dust. Reports from the tourists show that the roads throughout Wyoming were an agreeable surprise as to condition.

Almost from one side of the big desert State to the other a range of yellow hills lies to the northward of the Overland trail. At Sherman the road crosses the continental divide, nearly a mile and a half above sea level. To the southward stretches a vast tangle of rugged mountains, comprising the backbone of the American continent, and as the tourists progressed on the almost imperceptible down-grade, through the wide valleys dotted with gray-green sage-brush, where for hours the only living objects within view were occasional bunches of cattle, a stray coyote or jackrabbit and a few antelope grazing on the sparse bunch-grass near the cattle, they received a foretaste of what they were to encounter further to the west.

The trails in the heart of the Rocky Mountains are sometimes miles in width, where the floor of a valley is as level as a billiard table for considerable distances. Then again they narrow down to a single roadway, and where the trails are used for heavy freighting, to and from mining camps, they may be deeply

Rapidly Nearing Their Goal

scarred and rutted. The arroyos, or dry washes, propound serious problems in transportation to automobile drivers, and the occasional streams all have beds that are entirely out of proportion to their size. Crossing either wet or dry washes is a trying matter for car and driver, unless adequate bridges have been constructed.

But west of Wyoming the mystery of the real desert encloses the tourist. The sharp snap in the air at dawn; the exceeding heaviness of the dew upon the sage-brush; the awesome silence of nature; the brilliance of the sunshine and the glare of the desert trails all have their part in impressing the traveler with their strangeness and unreality; but at night, when the blazing constellations seem only about as far away as the polished globes in the ceiling of a Broadway theater; when the majestic motion of the moon is distinctly apparent and the only sound to be heard is the snarling yelp of a distant prairie wolf, the smallness of mankind is borne forcefully in upon the mind of even a casual observer.

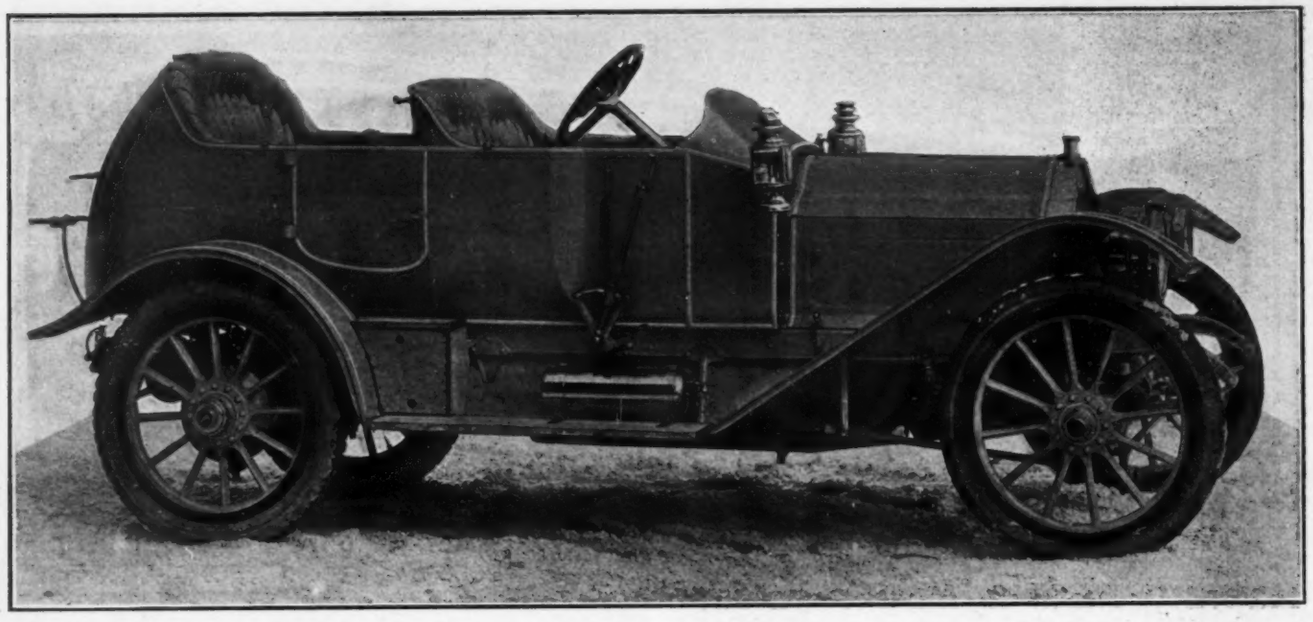
Nevada affords such a stage setting from the edge of the Great Salt Lake to the preliminary lifts of the Sierras. Entering this giant range from the east, the first sight of the saw-tooth ridge lying against the skyline is magnificent, and Miss Blanche Stuart Scott, of New York, in an Overland car which she has driven from New York, is just climbing that range at last reports. The tour is seven-eighths accomplished and while the final stretch is an exceedingly trying bit, it is no worse than some others.

Over a Baked Stream Bed.

Our Friend Blacksmith, Medicine Bow.

In the Red Desert Wyoming.

Top of Mountain 85 Mile West of Laramie.



Right side of torpedo model, showing side levers conveniently arranged outside of body line, with depression in body to accommodate them

Studebaker, South Bend—Offers Garford Models

DESPITE the fact that the Studebaker plant at South Bend extends over 101 acres, measuring floor space, the Garford models are made at the well-equipped Garford factory at Elyria, Ohio. The final finishing and tuning-up work, however, is taken care of at South Bend, and while the company turns out a wide variety of vehicles, including its well-known make of electric vehicles and a line of trucks, it proposes, nevertheless, to manufacture about a thousand Garford models for the coming season. The latest advices from the Garford plant are to the effect that the Model G-7 has passed so successfully through the 1909 and 1910 service that it will be continued, subject to such refinements as naturally would creep in in a progressive plant.

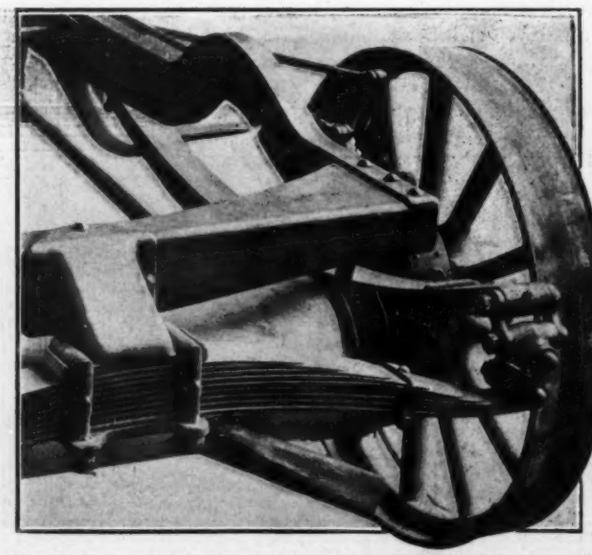
This model is offered with three types of bodies in the regular way, including a limousine at $5,000 that seats seven passengers, a touring car at $4,000 with the same seating capacity, and a speed car at $4,000 seating three. The equipment included with each of these models is two head lamps, two side lamps, tail lamp, shock absorbers, tool box with kit, coat rail, gasoline gauge, top irons, foot rest and horn.

Power Plant Includes 4-Cylinder Motor

The power plant is identical in the three models referred to, and includes the motor, which has a 36.1 horsepower A. L. A. M. rating which is based upon four cylinders working 4-cycle with a bore of 4¾ inches and a stroke of 5¼ inches. The cylinders are T-type of special gray iron with the inlet valves located on the right-hand side and the outlet valve on the left. The cylinders are cast in pairs, are water-cooled, with a centrifugal type of pump for water circulation, the latter being driven by a gear which is meshed with a half-time system. The radiator is of the honeycomb type with sufficient surface not only to serve initially, but taking into account the deteriorating influence of time. Lubrication includes a mechanical oiler with a pressure feed and provision for adjusting and observing the flow of lubricant. Carburetion is rather well cared for, utilizing a type of carbureter which has developed in this service; it belongs to the float-feed family with an auxiliary air valve which is, of course, brought into play at the higher range of speeds.

Ignition is of the make-and-break type, utilizing the Bosch magnetic plug system in conjunction with a Bosch low-tension magneto under hand control.

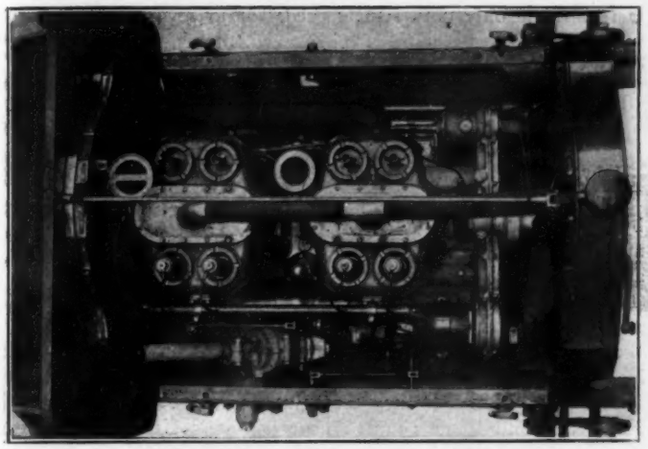
Besides the design features of the motor, which are further brought out by the illustrations here afforded, additional interest lies in the transmission system, taking advantage of a shaft-drive to a bevel gearset and a live rear axle of the full floating type. The power is taken from the motor by a cone clutch which is leather-faced with cork inserts, thence to a selective sliding gearset having four forward speeds and reverse with the distinction that the direct drive is on the third forward speed. This idea is liked by veteran tourists, because it assures that little extra increment of silence under all the normal conditions of road-going, and if perchance the sweet running qualities are slightly marred in the absence of the direct drive, it will only be at such enormously high speeds that the noise question ceases to be a factor, but with well-designed gears and the accuracy of workmanship which comes in a plant so wide in experience, it is not necessary to go into the direct drive to obtain a reasonably silent performance.



Rear of the chassis showing a stout cross member, support for the platform spring, method of shackling, upset chassis frame, and location of the muffler

Throughout the transmission system and the live rear axle annular-type ball bearings of properly sized selections are employed, notably among which will be found a thrust bearing for the clutch. The gearset, including the main and lay shaft, are mounted on these annular-type ball bearings, and the rear axle, including the floating of a differential housing passing through the front wheels, they, too, have these annular ball bearings, and, unusual as it may seem, they are extended to the steering gear. Parsons white bronze is used in the few places where it is not considered advisable to depart from conservative engineering to the extent of adopting ball bearings, as in the crankshaft, camshaft and clutch sleeve.

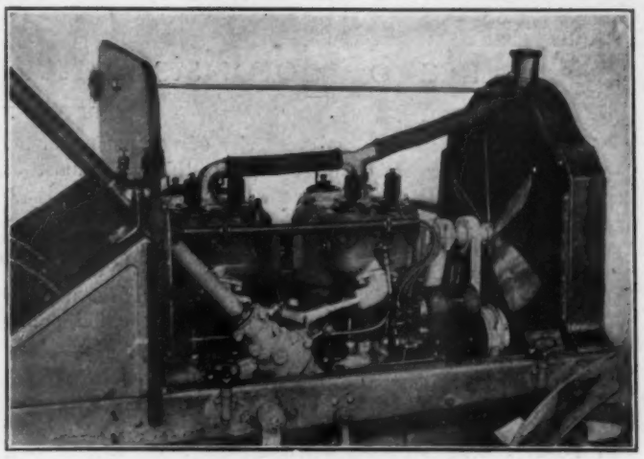
The fact that the car is heavily powered rendered it necessary to look well to the control system, to employ good materials in the control parts, and to so design that the application of pressure would be directly transmitted with substantial freedom from lost motion and the assurance that a pound of pressure applied to a pedal would be multiplied to the desired extent, making the pressure on the brakeshoe faces, for illustration, sufficient to skid the road wheels should the occasion require. The emergency brakes are under the guidance of a side lever; they are of



Plan of the motor depicting the relations of accessories, water connections, spark plugs, and other details

the internal expanding type. The service brakes, however, are constricting, and are under the command of a pedal.

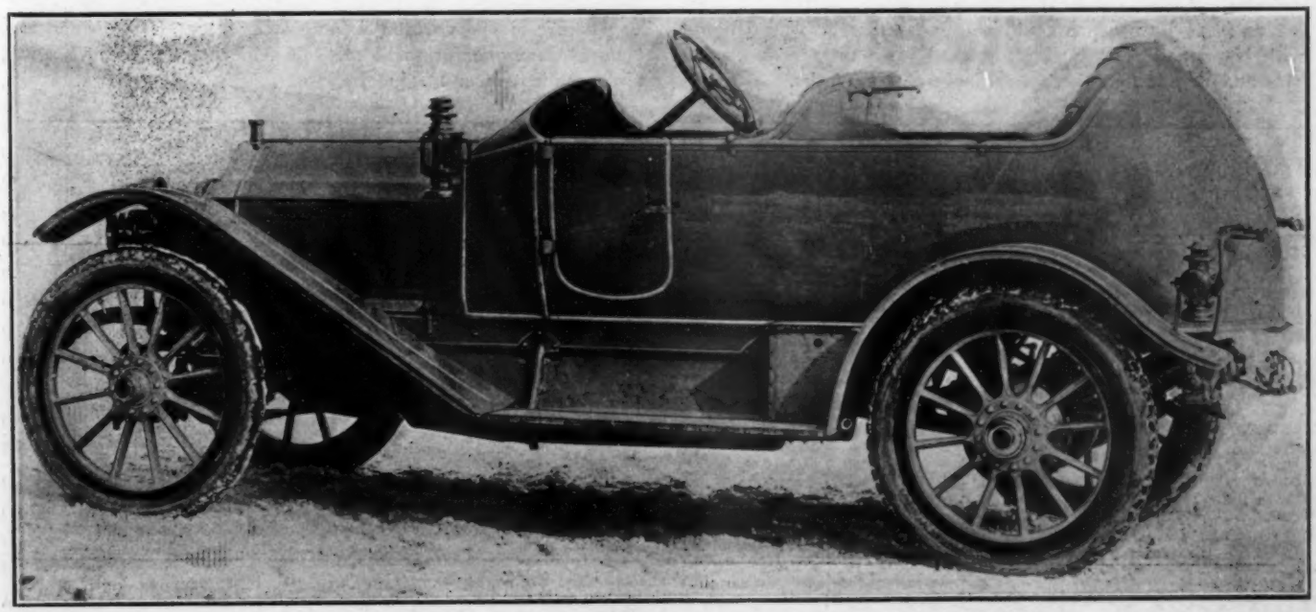
Among the details which are worked out to a fitting conclusion is the steering gear of the worm-and-sector type with F. & S. thrust-bearings, flanking the worm at either extremity, and



Right side of the 4-cylinder motor showing the location of the magneto, carbureter, and details

methods of design, which induce accuracy in the machining process, together with means of heat treatment to assure a glass-hard surface of the work, and such accuracy of the jigged housing that lost motion is eliminated, not only initially, but on a permanent basis. The steering wheel is of large diameter, and mahogany rim is built up on the flanging of a substantial dished spider, which in turn is fetched up on a taper and keyed to the steering post. The spark and throttle control are by means of nice-appearing levers on the top of the steering post, the motions of which are interpreted by bevel sectors meshing with pinions at the lower extremity of the wheel. The linkages between the steering wheel and the swiveling members of the front wheels are of substantial design with liberal bearings, means for keeping out silt, and devices for maintaining a proper state of lubrication. In many other ways throughout the car these same refinements in engineering detail are fittingly cared for, and grease cups abound at every point at which a squeak could creep in in the absence of lubrication.

The wheelbase is 117 1-2 inches with a tread of 54 inches, and the tire equipment is 36 x 4 front and 36 x 4 1-2 rear. The front spring suspension is semi-elliptic, but the half-platform idea holds sway in the rear. The materials used throughout the car are in accord with the present-day idea of quality, carried to far greater length perhaps in some cases. As per illustration, the I-section front axle is die-forged in one piece from a selected grade of nickel steel.



Left side of Torpedo model, showing entrance, overhung dash to give "dodger" effect, and rear contour which aborts the dust nuisance

Chicago Motorists Entertain 1500 Orphan Children

CHICAGO, July 16.—Almost every city of prominence in the country has remembered the orphans this year—most of them during the month of June—but it has remained for Chicago to wait for settled and warm weather before showing its charity toward the youngsters. Here the weather generally is raw in June, so the Chicago Motor Club, Chicago Automobile Club and Chicago Automobile Trade Association did nothing in this line until last Thursday, when the combination pulled off the most successful orphans' day in the history of the city, taking 1,500 children in 160 cars for a pleasant drive around the boulevard system—a ride of some 35 miles which was thoroughly enjoyed by the kids.

In a way Chicago's efforts differed from those of other big cities. It was believed the children would enjoy a long ride rather than to be taken to some amusement park and, acting on this theory, the joint committee from the three organizations, George T. Briggs, John H. Kelly and Joseph F. Gunther, started a campaign for cars. They didn't have much time in which to work and up to within a few days of the run it looked as if it would be impossible to get enough machines for all the children. It was felt that it would be better to call it off rather than leave even a single child behind, so the efforts of the committee were redoubled. Prominent citizens were called up by telephone, the row was raked with a fine-toothed comb, and at the eleventh hour it was reckoned there would be enough cars to visit the fourteen institutions that had been invited to participate.

That the charity appeals to all was shown by the fact that of the 160 cars in line more than 100 had been contributed by private owners. Society women became enthused and noticed in line were several electric runabouts. True, they could not carry many children, but their owners were doing the best they could to help and their mite was appreciated. It also was noticed that there were few high-priced cars in line and it was discovered that there exists in Chicago many a rich man who would not help simply because he was afraid the children might scratch the paint in the tonneau. There were exceptions to this rule, of course, and some of the big cars that were out were packed to the limit, even to having a row of small boys perched on the tops, which were lowered for the purpose of making more room. Extremes meet, they say, and so it was in this case, for in sharp contrast to the big machines was one old one-cylinder car with a detachable tonneau, whose owner was carrying as many boys as he could and apparently he was delighted with his experience. Several women drove their own gasoline cars and in addition there were several big trucks.

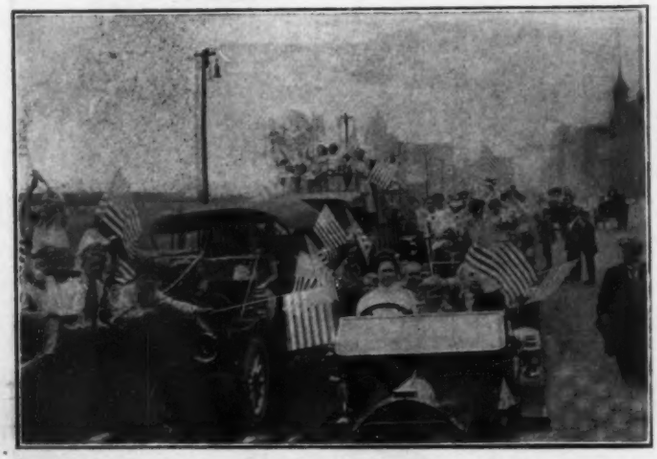
The Saurer truck carried fifty children and made an imposing appearance. The Chicago *Tribune* and the Chicago *Examiner* each sent out trucks which were filled with young humanity, while a White gasoline truck whizzed along with at least twenty-five kids aboard. The motor-cycle police were on the job and were of great assistance in keeping the cars in line and preventing scorching. Indeed, the marshals frowned down on any exhibitions of beating it and one driver was placed under arrest for endangering the orphans.

The ride was not the only feature of the afternoon. The committee had provided something else to delight the kids, distributing packages of peanuts and candy and also handing out more than 1,000 flags. While the outing was to consist only of the ride, there were many who stopped at the refectories in the south side parks and bought cake and ice cream for their charges. Toward the end of the ride there was a slight shower, but this did not detract from the joy of the kids. The orphans were not the only ones remembered, for in several of the cars were fifty from the homes for the aged, there being three institutions sending their people.

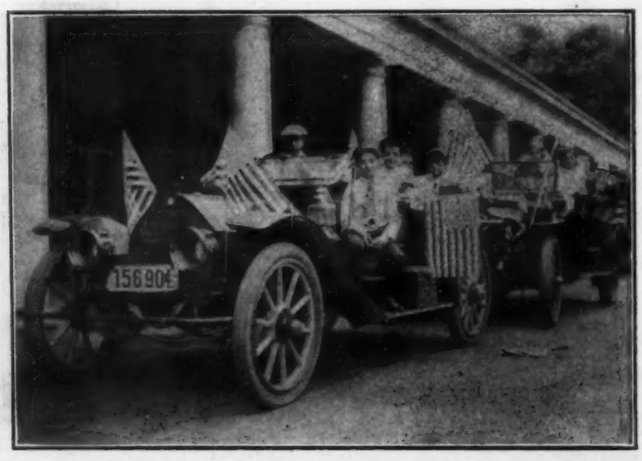
Lowell Aldermen Favor Road Race

LOWELL, MASS., July 18—At the last meeting of the Lowell Board of Aldermen action was taken on the petition presented by John O. Heinze, asking that the roads comprising the Merrimac Valley race course be closed to the public September 15, 16 and 17, and after a lengthy hearing the petition was granted. There was a counter-petition presented by Thomas A. Larkin, an attorney representing 22 residents of Varnum avenue, opposing the races, and a petition signed by a number of business firms asking that the part of Mr. Heinze's petition to close the roads on Saturday be denied. When those in favor of the petition were asked to stand to be counted nearly everyone in the chamber got up, and Mr. Larkin was the sole one to stand when those opposed were called. So the board granted the petition unanimously.

Mr. Larkin suggested that the matter might be taken to the courts by seeking an injunction. This was tried last year without avail. Mr. Heinze will appear this week before the Selectmen of Tyngsboro with another petition asking their authority to close such portions of the road as go through that town. As the Selectmen favored the petition when it was presented to the Legislature, no opposition is expected there. Two races are planned now, one for small cars, September 15, and another for big cars, September 17.



Start of the Chicago Orphans' Day outing



Many of the parentless "kids" stop at refectory for ice cream

Studies in Aviation Theory and Practice

By MARIUS C. KRARUP

(Continued from last week.)

REFERRING to Fig. 4 C, if the machine is advancing and the wings opposite to the side where the disturbance comes from reach the horizontal position, as shown in dotted lines, the counter-balancing support derived from them will be at its maximum, and on the whole the lateral stability in this type is therefore improved. But in normal flight the sloping wings do not support quite as well as the horizontal ones, and within a small angle they are more sensitive to a side wind than horizontal wings, offering a tilt aggravating the first attack, and this is especially the case because most winds are nearly horizontal. The lateral safety or stability of the aeroplane built with a strong dihedral angle, as compared with other aeroplanes, is most pronounced, it seems, in cases of extreme disturbance, as represented in the last figure of C. In any of these types the fore-and-aft stability seems to depend almost entirely upon speed and tilt rudders, which means that it is not automatic or dependable under all conditions. The most obvious means for producing stability of this description are apparently a low center of gravity well to the front, to prevent a backward tumble, and elastic rear edges for the wings of the main plane or planes, which will automatically counteract any disturbance by the wind tending to produce a headlong plunge.

Summarizing, the monoplane type has the best lateral balance, but it is difficult to build with enough surface to permit operation at small tilts, and the small tilt for normal travel alone gives range for up-and-down control (since tilt changes cease to be efficient above 15 degrees). With speed, a center of gravity placed forward of the center of a plan projection of areas can be supported, and without speed it produces automatically a gliding tilt, which is wanted when speed has ceased. Yielding rear edges give stability against forward plunging. The center of gravity may be lower than customary, if control is rendered positive by changing from rudder action by means of outlying surfaces to a system of relative mobility of the main supporting areas. Outlying control surfaces, being subject to the wind's attacks, themselves reduce stability. Planes of the highest carrying capacity per square foot increase stability by reducing wind-catching areas.

But the worst enemy of stability is any supporting plane which is located lower than the center of gravity, or on a level with it, and which is nearly horizontal in the normal position of the machine and concave downwardly, so that a change of its angle under an upsetting influence tends to produce a further change by increasing the efficiency of the disturbing wind action. This speaks for a design in which the monoplane's scant supporting area is helped out by lower supporting areas, but the latter formed with slightly convex surfaces (or the equivalent thereof) which are self-righting instead of self-upsetting. How much there should be of such lower surfaces must be a matter for experimental decision. A type intermediate between monoplane and biplane seems to be indicated as promising.

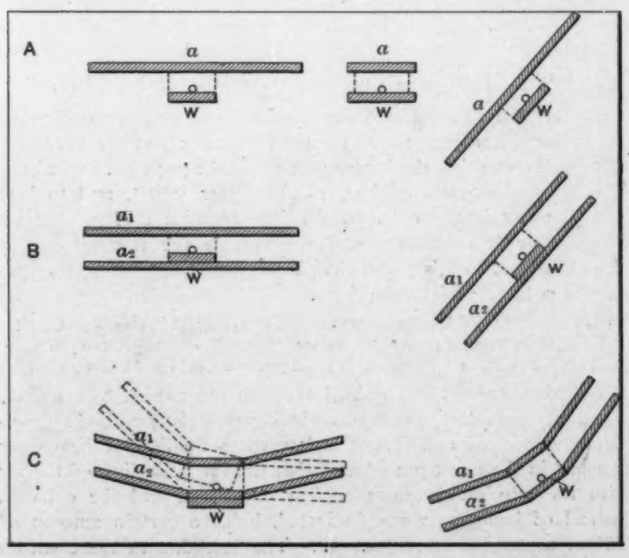


Fig. 4—Illustrating various phases of lateral stability

In several places trials are being made of boat-shaped substructures for monoplanes, and these should have a value for stability if proportioned closely in accordance with the areas and distribution of available superior surfaces and the strength of the propulsive power, because the double convexity of the boat shape—speaking of boats like the Norwegian or Malacca yawl—acts as a dihedral angle, roughly speaking, both laterally and fore-and-aft. But it is evident that the relatively feeble sustenance derived from convex surfaces in conjunction with the relatively high resistance against their propulsion should bring into play a very nicely balanced judgment on the designer's part in limiting the tangential angles of the convexity and the areas of the structures referred to. From the published reports with regard to them they seem to represent something less valuable. In some cases their designers seem to be actuated by a vague idea about imitating the shape of a bird's body, while disregarding the fact that the bird's main supporting surfaces are adjustable with relation to that body, and the other important fact that the bird disposes over a very high propulsive power not yet equaled or approximated in the use of small high-speed propellers for aeroplanes. In other instances the object of the boat-like structure is simply to provide an arrangement for starting from water or alighting on water. In principle, however, the convex auxiliary surfaces, arranged to mask features in the construction which, if left in the open, would anyway create air resistance without assisting in propulsion, seem to offer a fruitful field for investigation.

To increase fore-and-aft stability, there remains another possibility. With plane or planes extending at right angles with a vertical plane through the axis of the machine, the centers of sustentation-pressure form a line which shifts forward and backward with the speed of the machine, with a decrease and increase of tilt and therefore with changes in the load. By raking the wings of the plane rearward from the middle, so that their rigid front edges form a <, a broader support would be gained, and shifts of the centers of pressure due to accidental causes would require less counteracting by control movements; that is, the automatic stability would be improved, and the resistance to propulsion reduced.

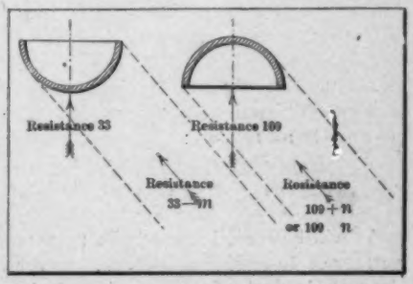


Fig. 3—Illustrating importance of shapes for stability

Automatic stability, being manifestly a product of many minor factors, each of which must be tried out quantitatively, is not likely to be gained in full measure except by the slow steps of an evolution. The designer's efforts for attaining as much of automatic stability as is consistent with facile control should be supplemented with equal efforts for reinforcing and improving the control of the machine's equilibrium and direction.

Some Points Worth Knowing About Automobile Gasoline

FUEL for internal combustion motors in liquid form is called "gasoline," which, in the old days, meant a certain distillate having a certain specific gravity, a certain value in the scale of volatilities, and its other characteristics were definitely established and generally understood by those who give matters of this sort passing notice. The coming of the automobile brought about many changes, it being true that the gasoline which was once rated as a by-product and a drug on the market mounted to the position of the fraction of first importance, and all the other distillates of crude oil were relegated to the rear, many of them reaching the low level which is normally designated as by-product. In coping with this problem, the distillers of crude oil began by tampering with the original gasoline, widening the range of temperatures used in the distilling effort, thus adding to the number of the contents, until finally the words "Automobile Gasoline" were coined to meet the occasion. That which was true of gasoline *per se* no longer obtained, since dealing with composite fuel was not the same as when dealing with a single closely confined distillate. The old idea, for instance, of sticking a hydrometer in the can to determine the specific gravity of the gasoline ceased to be valuable in the newer work since hydrometers are not made to determine the specific gravity of a plurality of distillates simultaneously. The only way to utilize the hydrometer advantageously will be to first separate the distillates, and then measure each one of them separately. These indications of the problems involved in the handling of automobile gasoline are but a few of the many which will have to be taken into account in a comprehensive estimate of its value, which, however, will only be possible if it is fully appreciated that the automobile gasoline of the day bears but slight relation to gasoline as it is technically designated.

Temperature of Change of State of Aggregation

Water boils at 212 degrees Fahrenheit, under a pressure of one atmosphere. As long as any water remains in the pot, no matter how hard the fire is urged, the temperature will remain constant until all the water boils off. The only way that steam can be superheated is to take it from the presence of water. The reason for calling attention to these well-known phenomena is in order to bring out the facts in relation to gasoline on a basis which will permit the average reader to grasp the situation. Gasoline, like water, must be changed in its state of aggregation from liquid to gas; in other words, it must be boiled, and the temperature of boiling of the gasoline must obtain in order to bring about the requisite heat exchange. Gasoline boils, of course, at a far lower temperature than water. Since it is a composite mixture, the temperature of boiling of the respective distillates are different, and in the ordinary process the more volatile of the distillates boil off first, leaving the heavier portion for the last, and the minimum temperature of boiling of the respective components is as follows:

MINIMUM TEMPERATURE OF EVAPORATION

Hexane	Heptane	Octane	Decane
17.7	3.6	19	42

As will be seen, hexane boils (evaporates) at a very low temperature. Referring to decane, however, the boiling point is 42 degrees above the freezing point of water, *i. e.*, 42 degrees Centigrade.

Heat of Evaporation Must Come Out of the Air

In the ordinary carbureter the gasoline is sucked out of the nozzle by the difference between the depression surrounding the nozzle and the atmospheric air. The spouting gasoline is more or less reduced to a cluster of multi-sized globules, the smaller of which form a sheet around the main stream in sufficiently fine subdivisions to be called a spray or mist; that there is very much mist is doubted, and one of the principal difficulties in carburetion is to obtain the minuteness of atomizing, which will permit of the quick transfer of heat from the inrushing air to the body of liquid gasoline, in order that the same may be boiled just as water is in a pot when a fire is put under the same. In the case of the pot and the water, the heat comes from the combusted fuel, and is transferred through the wall of the pot to the water to be boiled. Sometimes, however, water is boiled by directing a stream of steam into the body of same. In the case of the carbureter, a stream of air carrying heat is mingled with the stream of gasoline molecules and the excess heat in the air over that in the gasoline is transferred to the latter, and it, too, is vaporized as fast as the heat is transferred in quantity sufficient to counteract the latent heat of evaporation of the gasoline.

Minimum Temperature of Air, Considering Specific Heat

Just as the values for latent heat dispose of the question of the number of heat units required to vaporize the gasoline, so does the specific heat of air on the one hand, and of liquid gasoline on the other, afford a means of determining the minimum temperature of the air for a given temperature change. This minimum temperature is not the same for all the gasoline contents, and the table as follows tells the difference which must be observed, considering the respective distillates:

MINIMUM TEMPERATURE OF AIR FOR DIFFERENT DISTILLATES

Hexane	Heptane	Octane	Decane
1.3	21.5	36.2	56.8

These temperatures are on the assumption that no heat will be transferred to the gasoline, excepting out of the air; in other words, there must be enough heat available in the air at the minimum temperature in degrees Centigrade as above given to furnish the latent heat of evaporation, and the basis of arriving at this fact takes into account the specific heat of the gasoline and the specific heat of air. The latent heat of evaporation of gasoline cannot be stated with certainty without first ascertaining the exact proportions of the distillates. It may be approximately stated for a good grade of automobile gasoline as 210.5 British thermal units. The specific heat, or amount of heat required to raise 1 pound of gasoline 1 degree Fahrenheit is 0.500. In other words, a drop of 1 degree Fahrenheit in the temperature of 1 pound of gasoline corresponds to a dissipation of 0.5 British thermal units of heat. The specific heat of air at a constant pressure of 0.2375, and a drop of 1 degree Fahrenheit is therefore attended when 0.2375 British thermal units of heat are transferred from the air to the gasoline. If the temperature of the air is not below the minimum, as here stated, considering the respective contents, this condition will be brought about.

The Influence on Efficiency of Combustion

The highest obtainable thermal efficiency in an automobile type of motor (working 4-cycle) seems to be about 20 per cent. While it is true that the larger part of the 80 per cent. inefficiency is due to absorption of heat to the water jacket, and to heat carried away in the exhaust, the fact remains that combustion is more or less incomplete, and some of the thermal loss is directly traced to this point. With complete combustion, the products would be as follows:

PRODUCTS OF COMBUSTION PER POUND OF GASOLINE

Carbon Dioxide	Water Vapor	Nitrogen
2 pounds	1 1-2 pounds	11.8 pounds

The above result is obtained through the use of 15.3 pounds of air per pound of gasoline, assuming that the gasoline is completely vaporized and that it is burned to finality. What really happens in the average motor is that the intermingling of the air with the gasoline is more or less imperfect, and the exhaust, instead of being as above indicated, holds a certain amount of carbon monoxide and hydrogen. The loss due to these causes

may be directly estimated by determining the percentage by weight of the carbon monoxide and the hydrogen present in the exhaust, and by considering their fuel value in connection with the fuel value of the original quantity of gasoline.

An Excess of Atmospheric Air Is Necessary in the Mixture

Owing to the presence of products of combustion—in other words, to incomplete scavenging of the motor cylinders—it is impossible to arrive at anything like complete combustion when the quantity of air present is the theoretically correct amount. To overcome this difficulty it is customary to utilize an excess of air, and it is not uncommon to use as much as 60 per cent. excess over and above the theoretical right amount necessary for the complete combustion of the fuel.

The exact proportion of excess of air is not to be stated as a fixed value; it depends upon the compression. The higher the compression in the cylinder of a motor the higher must be the excess of air to afford complete combustion. One reason for this lies in the fact that the rate of flame travel is increased with increasing compression, and the allowance of time for the absorption of heat, and the contact of the molecules of hydrogen and carbon with oxygen is reduced. A second reason may be directly traced to the great difficulty of scavenging with the increase in speed of the motor, which is likely to follow when the compression is increased, so that one complication adds another, and it has been found in practice that the increase of air over and above the theoretical right amount is progressive rather than proportional to the relating factors. That there can be too much air is, of course, well understood.

The Enriching of Automobile Fuel

By JAMES S. MADISON

A discussion of the difficulties following the introduction of foreign substances into a motor's cylinders in the gasoline passing through the carbureter, and the methods by which greater power may be secured from a given quantity of gasoline.

SINCE the building of the first automobile every part of it has been subjected to the most careful and exacting study, with the hope of introducing improvements. The results show a marvelous development. After it had been demonstrated that the automobile had become a permanent factor in our industrial and social activities, a tremendous amount of time and study was spent in endeavoring to improve the available power of the engine. This led to a detailed and exhaustive examination of the ignition and carburetion systems—more especially the latter—of the compression pressures, of the size and timing of the valves, etc. When these important factors had been standardized many attempts were made to generate still more power by enriching the fuel—that is, by adding certain substances to it which would cause it to ignite more readily, or, being ignited, to burn more rapidly. That such attempts have not been generally successful, and in many cases have shown results that were undesirable is probably, in a large measure, due to a lack of understanding of the elementary principles involved in the operation of a gas engine, or to what may be called the experimental difficulties necessarily inherent in the attempt to introduce foreign substances into the cylinders through the medium of the gasoline passing through the carbureter. It is the object of this article to discuss these elementary principles as simply as possible, the methods that have been used for enriching, and to point out one method by which greater power may be secured from a given quantity of gasoline.

For the purpose of discussion, let it be assumed that the piston of one cylinder of an automobile or other internal combustion engine has just completed its suction stroke, by which it has drawn into the cylinder its charge of the mixture, composed of air and of gasoline in the form of vapor, which is a transparent, invisible gas, like the air we breathe, and which will burn, if it be supplied with the proper amount of oxygen and ignited. It is the function of the carbureter to supply to every particle of gasoline (in the form of a vapor or gas) that enters the cylinder the proper amount of oxygen for its complete combustion or burning, by admitting the correct amount of air, one-fifth of which is oxygen and four-fifths nitrogen. Assuming, further, that the carbureter is performing its function normally, there is in the cylinder a combustible mixture, or in common terms, one that will burn. If the carbureter admits too little air the mixture becomes too "rich," and will burn incompletely, or not at all; or, if too much air, the mixture becomes "lean," and will give equally unsatisfactory results; hence the necessity for adjusting the carbureter until it gives a mixture containing exactly the right proportion of air and gasoline vapor. If now an electric spark be passed between the points of the spark-plug, which projects into the cylinder and is surrounded by the mixture, it acts precisely like a match, the mixture is ignited, and burns so rapidly that a sheet of flame shoots from one end of the cylinder to the other. This is commonly called the explosion, and happens hundreds of time per minute when the engine is running rapidly. The burning of combustion has caused the formation of at least two new substances (there may be more under certain conditions, and usually are, but a reference to two will be sufficient for the present purpose) from the mixture of air and gasoline vapor; one of them is water vapor, or steam, and the other is the gas, carbon dioxide; in addition to these there is present in the cylinder the gas nitrogen which, as stated above, is a constituent of the air, and which was drawn into the cylinder with the charge. These three substances, and any others that may be present, under the influence of the intense temperature of the flame expand enormously—there is an enormous increase in their volumes—which produces a great internal pressure on the cylinder walls and piston head; since the latter is the only moving part, it receives from the expanding gases a tremendous impulse, which results in what is called the power stroke, the motion of the piston is communicated by means of the transmission and drive shaft or chain, as the case may be, to the rear axle. It thus appears that the motion of the road wheels is due to the burning, or combustion, taking place in the cylinder. The impulse imparted to the piston by the suddenly expanding gases, causing it to move, is the same kind of an impulse that is imparted to the projectile in a rifle.

One reason why the burning is not more rapid and the impulse transmitted to the piston not more powerful is that for every part of oxygen drawn into the cylinder four parts of nitrogen are also drawn in. This nitrogen is not only useless in increasing the effects of the burning, but, on the contrary, it is a positive deterrent, since it dilutes the oxygen to such an extent as to neutralize much of its desirable effect. If the proportion of the nitrogen could be reduced, the burning would be correspondingly more rapid with the consequent more rapid expansion of the gases formed, which would result in more powerful impulses being delivered to the piston. One method of reducing the proportion of nitrogen is to increase the proportion of oxygen. This has been done many times by mixing certain substances with the gasoline. A substance, to be of value in this connection, should have the following properties: it must contain a fair proportion of available oxygen; it must decompose readily into its constituents; it must be soluble in gasoline; when burned in a closed space it must not leave a liquid or solid residue, and the products formed by burning it must have no injurious action on metal.

(Continued on page 114.)

Letters Interesting, Answered and Discussed

Discussing burning qualities of gasoline; the principles of magnetos; causes of wobbling of front wheels; electric lighting; qualities for racing drivers; automatic stability in aeroplanes.

May Be Slow Burning

Editor THE AUTOMOBILE:

(2,333)—I have a garage made of wood within 10 feet of the wooden dwelling in which I live, and while I have no trouble getting insurance, the fact remains that I worry about the fire risk, and wonder if the insurance will be hard to collect in case the house burns down due to a fire resulting from the presence of gasoline in the garage. Can you set my mind at rest?

G. J. M.

Evansville, Ind.

Call upon the Board of Fire Underwriters and see if the rules are being violated by having a garage within 10 feet of a dwelling house. If so, move the garage far enough away to conform

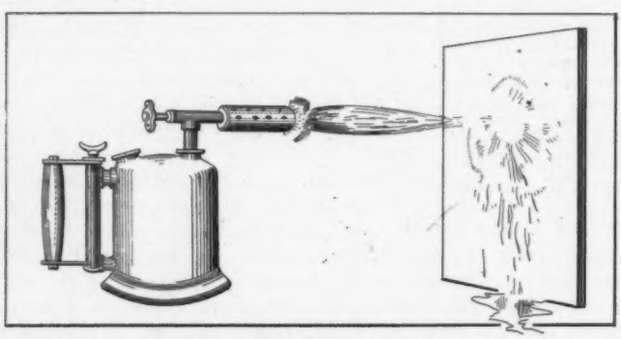


Fig. 1—A lighted gasoline torch blowing the burning liquid against a sheet of tin, burning the hexane, and the heavier distillates, after splashing against the plate, trickle down to the ground.

to the rules. Rules are formulated for reasons that are probably good, and to follow them is a necessity if you wish to be sure that you will not be held responsible for their violation. In the meantime, gasoline in liquid form in a tank is non-inflammable, due to the fact that oxygen cannot mix with it in its liquid state, but even if oxygen were dissolved in the liquid up to the limit of saturation it would still be non-inflammable. The only way gasoline can be burned is by changing it to a gas in the presence of oxygen, and even then it resists burning to some extent. Fig. 1 is a simple illustration of the non-burning qualities of gasoline. It shows a torch which is lighted, and so adjusted that the flow of gasoline is at a high rate. The excess gasoline splashes against the plate shown, and trickles down over the surfaces to the ground without burning. The particular part of the gasoline that burns is hexane, of which there is only a small portion present; the volatility of the rest of the gasoline is relatively slow, and it fails to burn under the conditions shown, because it resists the gasifying process, and as before stated, it will not burn until it is gasified.

If the tanks containing the gasoline are not tight, it will evaporate even at normal temperature and form a combustible mixture with the oxygen of the atmosphere, which will ignite upon contact with a flame.

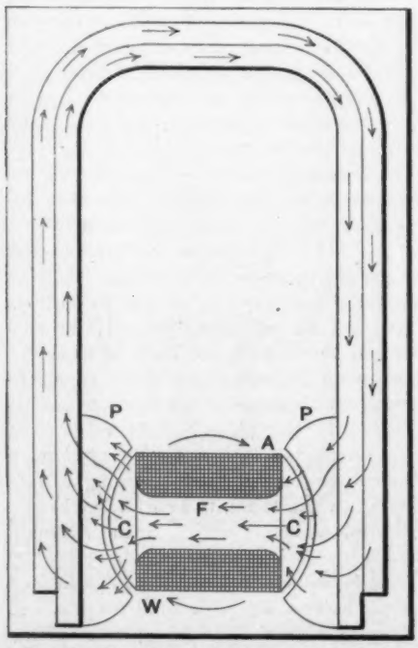


Fig. 2—Characteristic diagram of a magneto with a single winding on the armature showing the closed magnetic circuit

Some Questions in Relation to Magnetos

Editor THE AUTOMOBILE:

(2,334)—When I look at a magneto as it is installed in an automobile, I see so many trinkets hanging thereon, and find it nested among so many other things, that, in view of my lack of experience I become confused, and yet I realize that a man who drives an automobile ought to understand the A B C of the situation, and I appeal to you in my helplessness, hoping, perchance, that you will be able to separate out a few of the essential particulars and illustrate them in your customary clear fashion for my benefit, but I think I may say that I am not alone in this wilderness of confusion, so that your audience will scarcely be limited to one subscriber.

PERPLEXED.

Camden, N. J.

You can scarcely expect to obtain all the information you want outside the two covers of a "fat book." In the meantime, if the ignition situation is separated into its components, the respective divisions may be studied with some hope of eliminating confusion. There are three types of magnetos in vogue, (a) low-tension, (b) high-tension, and (c) combination magnetos. All magnetos, of whatever system, are composed of a wire-wound armature and a permanent magnetic field. As a rule, the armature rotates and the lines of force, which reside in the permanent magnetic field circulate through the rotating armature as shown in Fig. 2, the arrows indicating the direction of flow of the magnetic flux, and when the armature rotates, the lines are throttled as shown in Fig. 3. The variation in the magnetic flux, as indicated between Figs. 2 and 3, is responsible for the induced current which is set up in the wire windings on the armature, which current is the product of the difference of potential which results from a change in the intensity of the magnetism. The windings do not have to be on the armature, and Fig. 4 shows a type of magneto which has its windings on the soft polar members to which the permanent magnets are attached. In this case the intensity of

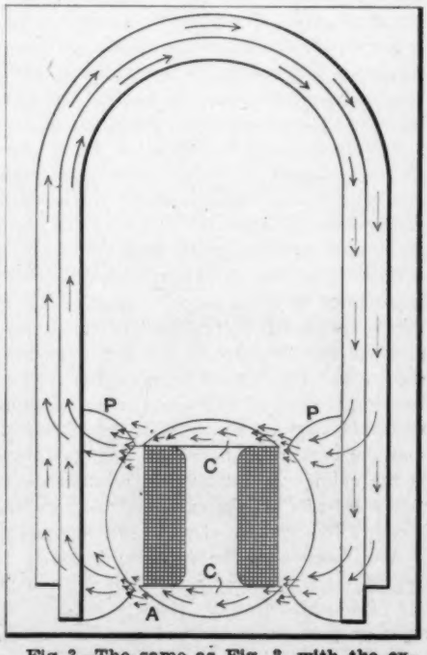


Fig 3—The same as Fig. 2, with the exception that the armature is rotated 90 degrees and the circuit is interrupted

the magnetic field is varied through the revolution of the rotor A, which has radially disposed extensions, and the path of the magnet field is interrupted periodically. Still another form of magneto is given in Fig. 5. In this case, the armature is stationary, the windings W being over a fixed body. The permanent magnets are bolted to soft polar horns, and a shell-like rotor occupies the space between the polar faces of the wire wound bobbin and the soft polar horns of the permanent magnets. Here again, the rotor is responsible for variations in the magnetic field brought about by periodically interrupting the continuity of the magnetic circuit. Fig. 6 is offered in order to bring out the point to be made in relation to the "condenser," which is always used in conjunction with ignition systems. In this example, the magnetic field comprises permanent magnets F, G and H with soft polar horns BB bolted thereto, and the bobbin wound rotor A, the windings showing at D, but the condenser E is housed in a rectangular aperture within the bobbin. The condenser is made up of flat sheets of tinfoil insulated from each other, and connected up in parallel. The difference between a high and low-tension magneto, barring a few details in connections and arrangement, is confined to the winding on the rotor. If there is only one winding of coarse wire, it is a low-tension magneto, but if there are two windings, one of coarse wire and the other fine, a high-tension magneto results. The composite arrangement is made up of a low tension winding on the rotor of the magneto, which connects to an ordinary spark coil which may be located on the magneto or elsewhere. The voltage of a low tension magneto is too low to jump the gap in a spark plug, so they use a wipe spark system, which is so arranged that the circuit is first made by a hammer striking an anvil and when the hammer bounces off of the anvil, the arc is drawn, and the mixture in the cylinder is ignited. With the high-tension system, the voltage is about 20 times that of the low, and the spark gap in the plugs is broken down at the right instant, thus inflaming the mixture. There are many other points in detail which ought to be looked into by an inexperienced autoist, but there is no reason why confusion should result. All of the items to be mastered are quite simple, and by taking them one at a time, just as one must do in acquiring a knowledge of the French tongue, for instance, the progress that can be made in a short while is astounding.

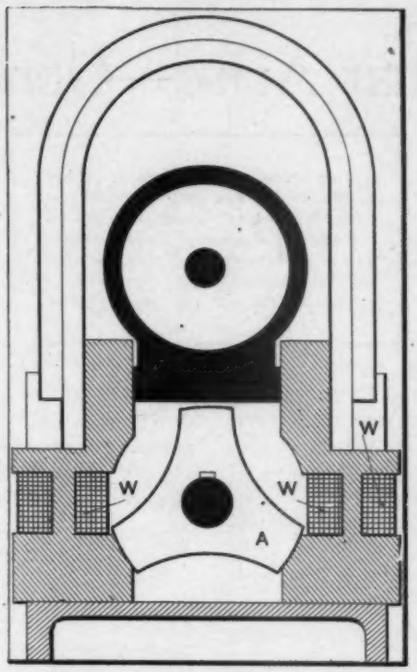


Fig. 4—Type of magneto using a rotor to interrupt the magnetic circuit, but the windings are on soft polar members to which the permanent magnets are bolted

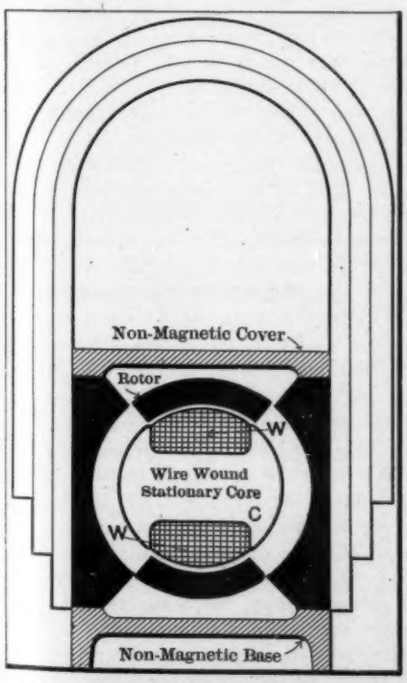


Fig. 5—Type of magneto using a shell rotor, permanent magnets bolted to soft polar horns, and fixed armature of bobbin-like design on which windings are placed

Wrong Design or Worn Out

Editor THE AUTOMOBILE:

(2,335)—I have never seen anything in your valuable paper in reference to the front wheels of an automobile wobbling. I am troubled this way, and perhaps others are, so an answer in your "Letters Interesting" would perhaps help a number of your subscribers. I am annoyed by my front wheels wobbling when going over rough places, and I understand some French cars do the same. I have gone over all the parts and joints and they are all absolutely without play; they are all ball and socket type, so can be adjusted perfectly. The only looseness is in the steering gear proper. When running fast or on smooth roads the wheels do not wobble. Any advice you can give me will be appreciated. W. W. TREVOR.

Lockport, N. Y.

One cause of wobbling of the front wheels is assignable to short steering knuckle arms. This difficulty is rarely present in automobiles, it being the case that most designers realize that the steering knuckle arms should be quite long so that the steering action should be quite "slow." Lost motion is, of course, a prominent cause of front wheels' eccentricities. The way to overcome this trouble is to have the automobile repaired.

Electric Lighting Has Many Advantages

Editor THE AUTOMOBILE:

(2,336)—Will you please advise me in your question and answer column whether you consider it worth while to replace acetylene lights with electric lights. I can appreciate that it would be a great luxury to be able to turn the lights on or off by pressing a button, but I believe that storage batteries would soon be discharged, and do not want the bother of taking them off the car to be recharged. I would like to have a complete lighting plant on my car.

A. E. W.

New York City.

If you can afford to install an electric lighting system it will serve you well, and add to the pleasure of touring. If you keep your acetylene system in order, it, too, will be your faithful slave.

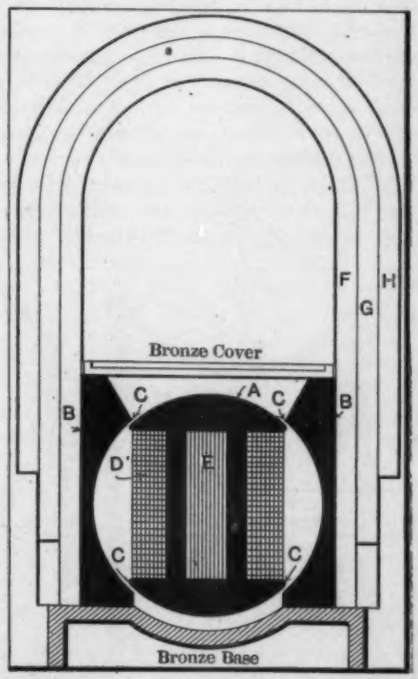


Fig. 6—Type of magneto using a bobbin wire-wound armature, soft polar horns to which the permanent magnets are bolted with the condenser within the armature

Questions That Arise—General In Scope

Discussing ills of mufflers; proper methods of suspending mufflers; advantages and disadvantages of the several shapes of pistons; main points in relation to valve springs; manner of contriving valve motions so that timing can be varied at will.

(178)—Is silence of a muffler attended by increased pumping losses of the motor?

Not necessarily; but, as a rule, silence is attended by back pressure, and the pumping losses are augmented in consequence. Fig. 1 shows a conventional type of muffler which works on the obstruction principle; the exhaust flows into the muffler through the exhaust pipe, and is split up by having to pass through a large number of small holes on its migration to the muffler chamber. This splitting process is at the expense of back pressure, and to whatever extent the obstruction suffered may be estimated in pounds per square inch as back pressure, it represents the measure of the deduction which must be made from the mean effective pressure before the same can be used in the formulæ for determining power. The gas after being split up by passing through the small holes as it enters the main chamber is scattered and it then oozes out through the orifice robbed of its ability to make a noise.

(179)—How should mufflers be suspended on the chassis frame, all things considered?

In view of the fact that mufflers are heated to a point sufficiently high to vaporize lubricating oil, they should not be placed in a position where lubricating oil can get at them, for then they will become a nuisance and serve as the basis for a violation of smoke ordinances. They should be flexibly mounted, and the piping leading from the motor should be so hung that its weight will not come on the muffler. The suspension shown in Fig. 3 is a fair illustration of a good way, but the exhaust pipe leading from the muffler to the atmosphere should not be pointed down as therein because the exuding exhaust will then brush against the roadbed, picking up dust, thus becoming the basis of a road nuisance. Fig. 2 shows the exhaust pipe to the atmosphere in the right position, but in this figure the muffler is not flexibly mounted, and it has the further disadvantage of having to carry the weight of the exhaust pipe and the additional fault of having the exhaust pipe in interference with the rear axle. As a final injunction, attention is called to the necessity of noiselessness, and this requisite is only to be consummated if the parts are all in secure relation and free from interference. A muffler cut-out serves no useful purpose whatever. It offers to a chauffeur wide opportunity to annoy the public at large, giving him a means of calling attention to his exalted position, and it is proof of the fact that the motor is not big enough for the work to be done, or that the back pressure of the muffler is greatly in excess of that which is dictated by good designing, unless it is attached as a matter of business expediency, with the idea that it will serve as a selling point, hoping to attract the notice of the budding autoist, who, unfamiliar with the technical situation, absorbs information from whatever source indiscriminately.

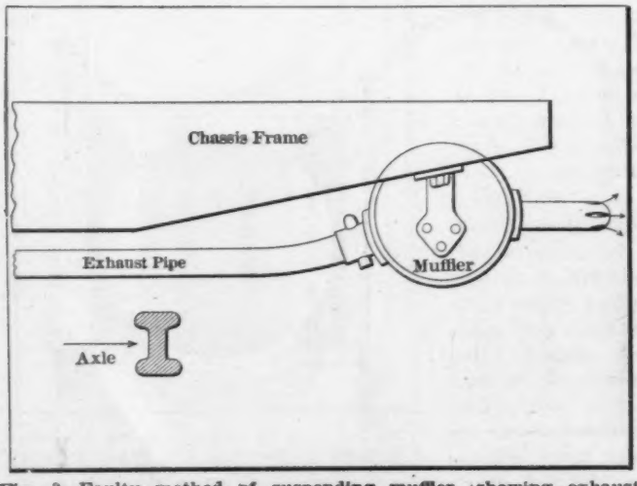


Fig. 2—Faulty method of suspending muffler, showing exhaust pipe in the right position

(180)—What are the advantages and disadvantages of the several shapes of pistons?

Referring to Fig. 4, A is a flat-head piston, B is of the convex-head type, C is spherical, and D represents the inverted sphere. Taking them in the order named, A, the flat-head type, offers no advantage, but it has the inherent defect which comes when a weight must be supported by a flat member, instead of an arch, has the further defect of not being a good shape from the foundry point of view, and when the internal strains are released, as they must be sooner or later, the head is likely to crack. B, with its convex head, which may have the form of a flattened ellipse, is regarded as the conventional type. It has the arched structure, which is capable of sustaining the greatest possible weight, and its shape is agreeable to foundry practice, so that the internal strains are relieved, and the chances of cracking in service are substantially eliminated. This form of head lends itself perfectly in designing; it permits of a spherical dome of the combustion chamber, and works out so that the compression of the motor will be substantially 75 pounds per square inch (absolute). Referring to C, of the spherical head, it has the disadvantage of offering too much surface, thus permitting a large amount of heat to pass through the wall and to the crankbox, hence decreasing the thermal efficiency of the motor and complicating the lubricating problem. But if there is no encouragement to be offered for the design C, the fact remains that it has many points in its favor as compared with the design D. All that has been said against C applies to D, but there is the further disadvantage in the latter in that it not only adds to the surface which will serve as a gate for the transfer of heat, but the metal of the head, where it joins the metal of the barrel, makes a bunching and a shrink hole is pretty nearly sure to be induced, if, indeed, there may not be a collection of them all around the rim.

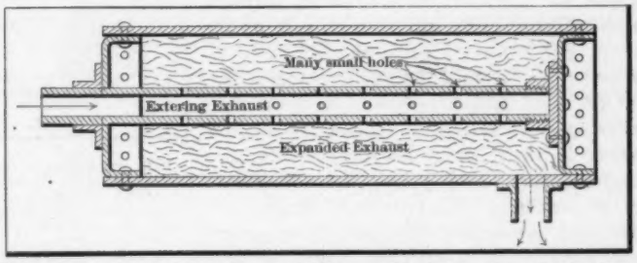


Fig. 1—Characteristic type of muffler which induces back pressure

(181)—What are the main points in relation to valve springs?

The wire should have the properties which come from the use of the best spring steel; there should be at least 10 turns of wire in the spring, as shown in Fig. 5, and the distance S should be so great that when the spring is compressed the respective turns will not contact with each other. The diameter of d of the wire should be so regulated that the diameter D of the coil will be sufficient to afford a live spring limiting the torsional moment to a point well within the elastic limit of the material so that the spring will remain substantially of constant strength from the beginning of its life to the ending of the life of the motor. This latter condition will only be possible if the spring is so placed that it will not be annealed by the heat which radiates from the motor cylinders. A table of the dimensions of various sizes of

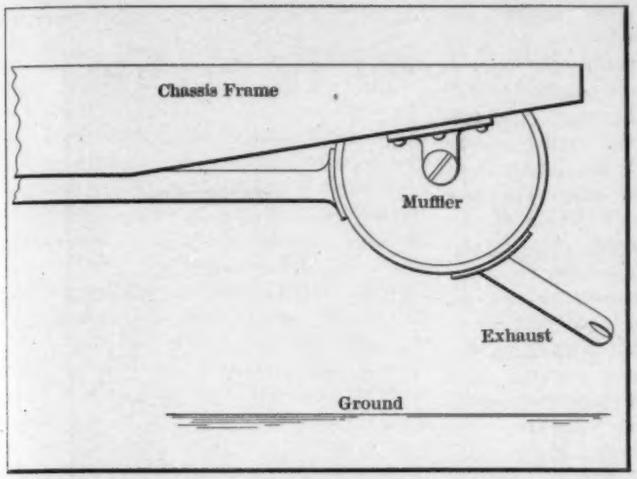


Fig. 3—Flexibly mounted muffler, showing the exhaust pipe in the wrong position

springs is given in Fig. 6. Knowing the weight in pounds which the springs must exert, it is possible to pick out sizes which will do the work.

(182)—Why is the "finish" so much restricted in cylinder designing, and why is it not a good idea to allow for several reborings?

The reason why it is necessary to re-bore a cylinder is because the wall surfaces are of uneven texture, and too soft to withstand continuous service under the severe conditions obtaining. Designers desiring, in the first place, to have the weight efficiency as high as possible take advantage of the fact that white metal is dense, hard, and strong. Gray iron, on the other hand, is soft and is likely to be of varying texture. White metal in a cylinder is induced by so regulating the charge that it will take on the property technically known as "chill." This "chill" is not to a great depth in good cylinder metal, so that in order to preserve the white metal surface the finish must be restricted. It will be remembered that all finished metal is machined off, and what is wanted in completed cylinders is just enough finish to permit of making a smooth bore without cutting through the white metal coating into the gray iron texture. Fig. 7 illustrates the situation with sufficient clearness, showing the chilled surface metal and the soft core.

(183)—Is there not some way of contriving valve motions so that timing can be varied at will?

There are several plans which include mechanical means for varying the timing of valves, one of the most interesting of which is shown in Fig. 8. In this case there is an auxiliary roller mounted on a boomerang which is pivoted at one end to an arm,

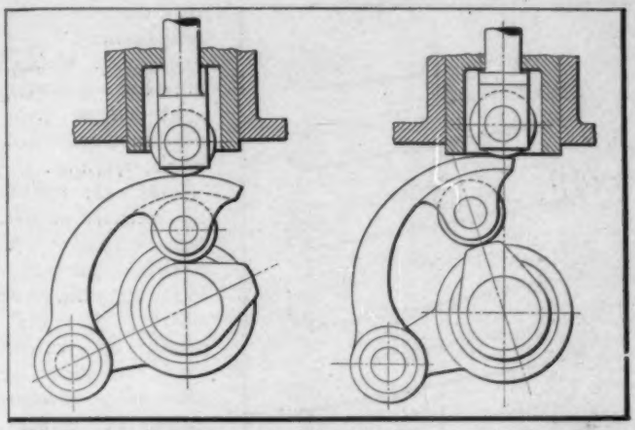


Fig. 8—Boomerang type of mechanism for use in timing valves

the bearing of which is concentric with the camshaft. The boomerang, not being to unit radius, affords a means for varying the distance between the face of the cam and the roller proper on the valve lift. By rotating the boomerang arm the adjusting distance is changed at will, and the amount of adjustment may be fixed upon by changing the contour of the roller contact surface of the boomerang. This device is said to work extremely well, and while it offers some evidence of complication, the fact remains that the parts are stable and there is ample room in a motor for a device of this character.

(184)—What are the troubles to be expected from timers?

It is difficult to predict; the best way is to test the particular timers and locate the troubles. The following test of a Herz timer should prove interesting.

The timer consists of a primary breaker and a high-tension distributor.

The timer was driven by a 5-horsepower shunt motor, using an Autocoil and a Gould 6-volt storage battery. Speed constant at 1200 r.p.m.

Started	Stopped	Elapsed Time Hr.	Min.	Speed
10:20	12:05	1	45	1200
12:30	2:45	2	15	"
10:20	12:00	1	40	"
12:30	2:05	1	35	"
8:30	12:00	3	30	"
12:30	5:40	5	10	"
8:00	12:00	4	00	"
12:30	6:00	5	30	"
		25.4		

Therefore, the total number of revolutions =

$$25.4 \times 60 \times 1200 = 1{,}828{,}800.$$

The sparking was very irregular at 1200 unless the contact cam faces were wiped clean frequently. The highest speed for good

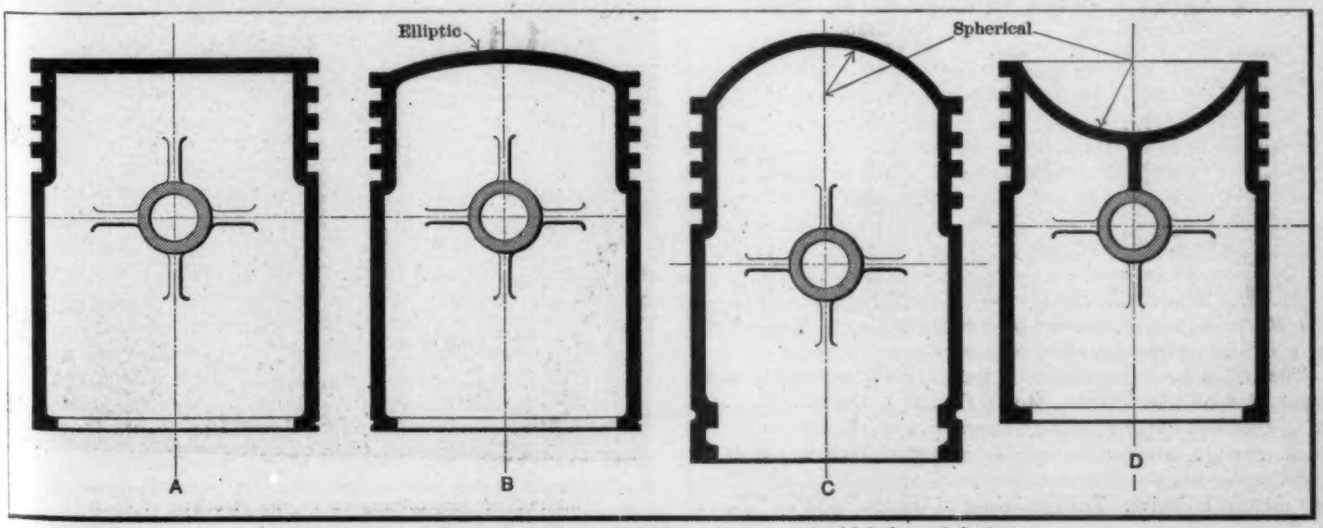


Fig. 4—Depicting various types of pistons, only one of which is satisfactory

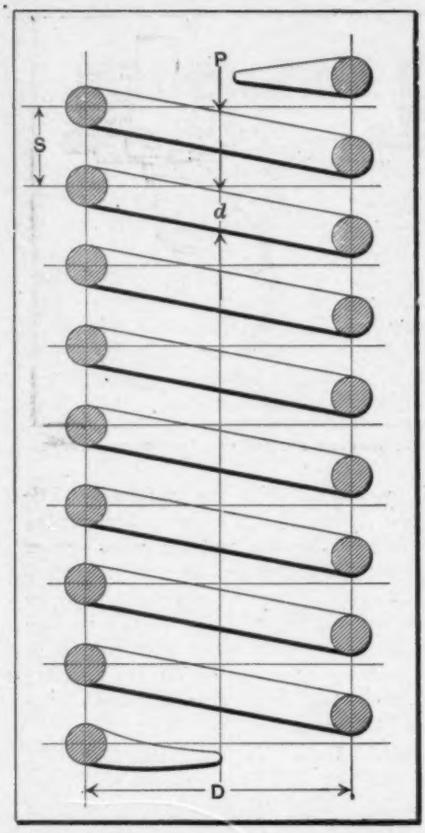


Fig. 5—Diagram of a valve spring to be used in conjunction with the table in Fig. 6

sparking was in the neighborhood of 1,000 r.p.m. Several different coils were used, but no great difference was noted in the sparking.

(185)—In view of the extended use of the Wheeler & Schebler carbureter in racing work, considering its simplicity of design, and remembering that many foreign makes of carbureters are almost as complicated as motors, considering further the fact that detailed information is not obtainable from racing reports, it becomes of interest to learn something of the detailed performance of this carbureter. Can you give the information?

The following test of a Wheeler & Schebler carbureter conducted in accordance with the directions usually furnished by the maker, speaks for itself:

Three runs were made with a No. 5 needle, and the best run is chosen to show the action of the carbureter. Other runs were made, among which five, using a No. 7 needle, but it was found that up to 1,200 revolutions per minute there was no appreciable difference. Beyond 1200 revolutions per minute the No. 7 needle produced a better result. The carbureter performed favorably throughout the range of working speeds of the motor. It was found, of course, that at very high speeds the torque of the motor fell away, but it was not shown that this dimension in torque was due to the carbureter, although it is quite well understood that carbureter problems become serious at high motor speeds. However, the fact remains that motors do not thrive at high speeds.

WHEELER & SCHEBLER CARBURETER TEST

Speed	Gross Load, Lbs.	Tare, Lbs.	Net Load, Lbs.	D. H.P.
600	52.00	27	25.00	15.00
700	52.50	27	25.50	17.80
800	51.50	27	24.50	19.60
900	50.75	27	23.75	21.40
1000	51.75	27	24.75	24.75
1100	51.00	27	24.00	26.40
1200	50.00	27	23.00	27.60
1300	49.25	27	22.25	29.00
1400	48.00	27	21.00	29.40
1500	47.00	27	20.00	30.00
1600	46.00	27	19.00	30.40
1700	45.00	27	18.00	30.60
1800	44.00	27	17.00	30.60
1900	43.00	27	16.00	30.40
2000	43.00	27	16 00	32.00

(186)—Can you show a test of a muffler on a motor which will give an idea of the amount of back pressure induced?

The following is the test of a muffler which was made at the plant of the E. R. Thomas Motor Company, Buffalo, N. Y., by L. C. Freeman, which is fairly representative of this situation. The back pressure is given in pounds per square inch at speeds increasing by 100-pound increments from 400 to 1,500 revolutions per minute, inclusive. The conditions of the test were as follows:

The muffler was connected to the motor with 15 feet of 3-inch (outside diameter) steel tubing, having a wall thickness of 1-16 of an inch. The back pressure in this length of tubing was found to be one-quarter of a pound at 1,500 revolutions per minute, but fell to a nominal point at 1,000 revolutions per minute. The muffler was 9 inches in diameter, and the throttle valve was wide open at all speeds during the test. The exhaust, as observed, was a soft, steady purr at all speeds when about two-thirds of the maximum power was being developed. Beyond this point the noise increased somewhat, but it was claimed that this increase was not more than might be expected from mufflers in general. The test was somewhat marred, due to the fact that the muffler leaked around the head.

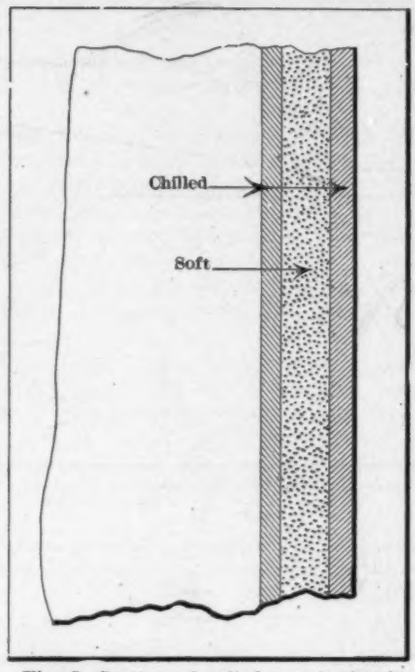


Fig. 7—Section of cylinder wall showing chill metal on surfaces and soft gray iron in the core

DATA OF THE MUFFLER TEST USING A MANOMETER

R.P.M.	Brake	Manometer Inches of Mercury	Back Pressure	H.P.
400	84	1.5	.73	19.2
500	81	1.75	.86	23.
600	75	2.00	.98	26.7
700	67	2.37	1.35	26.8
800	64	B	1.47	29.4
900	64	3.25	1.59	32.8
1000	61	3.75	1.84	34.8
1100	60	4.00	1.96	38.7
1200	60	5.00	2.45	43.3
1300	55	5.25	2.60	40.6
1400	53	5.75	2.80	42.2
1500	49	6.00	2.94	42.0

Note: This back pressure is not unreasonably high. The motor was not developing the maximum power of which it is capable at the speeds given, so the back pressures are correspondingly lower.

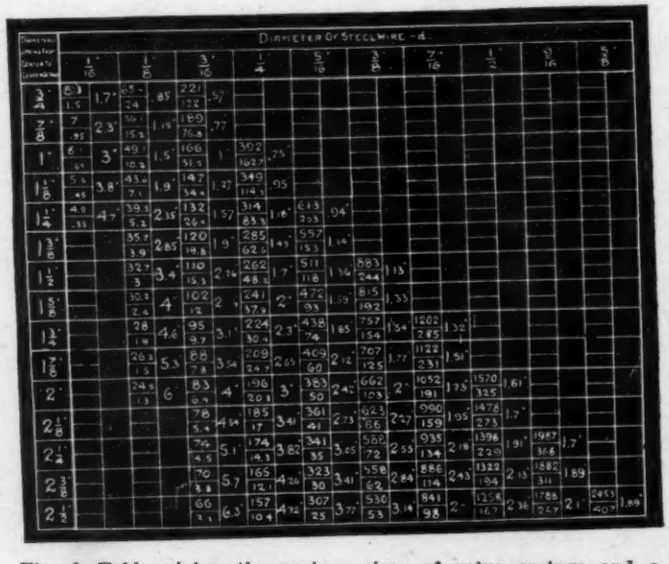


Fig. 6—Table giving the various sizes of valve springs and a method of determining as to the strength of each

Liquid Fuel for Motor Car Engines

By DR. JAMES B. READMAN, F. R. S. E.

Paper read before the Royal Scottish Society of Arts; treats with fuel of various grades; a Sunbeam side-chain drive thermo-syphon car was used; fixed road conditions were adhered to; the fuel used during the trial comprised Borneo petrol, benzol, motor spirits, naphtha, and other distillates in different proportions.

AT a recent meeting of the Royal Scottish Society of Arts a paper was read by James B. Readman, F.R.S.E., giving the results of a series of tests with the various fuels used on a 20-horsepower Sunbeam chain-driven car adapted for the trials. The car had four cylinders, 105 by 130 mm., thermo-syphon cooling; tires, 880 by 120 mm. The main petrol tank was below the driver's seat, and a second one for the experimental fuel was fixed to the dashboard. The tanks were connected by a pipe to the carbureter, which was provided with three-way cock, so that the fuels in either tank might be used at will. To make the results as closely comparative as possible, Dr. Readman selected a suitable portion of the high road leading from Penrith to Appleby. The tests took place over one part of the road, so as to eliminate any difference in gradients, and they were all carried out on one day, to avoid, as far as possible, any climatic changes.

The fuels used were as follows:

1.—Shell Borneo petrol, sp. gr. .720, as a standard well-known fuel.

2.—Ninety per cent. benzol, sp. gr. .880. Engine very difficult to start when cold.

3.—Shale motor spirit, sp. gr. .704. This spirit begins to boil at 44.4 degrees C. (112 degrees F.), and 65.5 per cent. is distilled at the boiling point of water. Engine starts readily.

4.—Shale naphtha, sp. gr. .740. This begins to boil at 82.2 degrees C. (180 degrees F.), and 58 per cent. distils over at the boiling point of water. Repeated trials have proved that the engine starts fairly readily with this spirit, even when all is cold.

5.—Fifty per cent. shale motor spirit with 50 per cent. benzol, sp. gr. .785.

The incoming air to the carbureter in the type of motor used is heated from the exhaust gas pipe. No attempt was made in any of the experiments to alter the float of the carbureter.

Results of the Tests.

The following tables give the results of the tests:

One-fifth of a gallon of each fuel was used. Four persons were in the car. Dusty road. Weather and temperature: Sunny; 54 degrees F. Weight of car (empty), 30½ cwt.

Fuel.	Miles per hour.	Time. M. S.	Distance. Mls. Yds.	Fuel per car mile. Gals.	Miles per gal.
1.	26.2	8 26	3 1177	.054	18.3
2	24.8	10 0	4 250	.048	20.7
3.	25.2	8 40	3 1110	.055	18.1
4.	26.5	8 50	3 1360	.053	18.8
5.	26.5	8 34	3 1327	.053	18.7

No smoky exhaust from any of the fuels. The engines pulled well with all except No. 4. The temperature of the water in the radiator was 195 degrees F., at the end of each run, in every case except No. 2, when it was 200 degrees F. Benzol gave the best result—*viz.*, 20.7 miles to the gallon, against 18.8, the best of the other four. Dr. Readman observed no practical difference in the behavior of the engine with the exception of the naphtha, with which it misfired a good deal. A mixture, however, of 40 per cent. of naphtha with 60 per cent. of the motor spirit gave a fairly good result, and one that the car had run on for many miles satisfactorily. At the start, however, the engine inclined to misfire for a short time. He said that with an auxiliary tank for motor spirit or petrol to start the engine, the use of the home product, benzol, could not be too strongly recommended, and its further production encouraged. The use of Scottish shale spirits offered a good alternative fuel. Its strong odor, however, was a drawback to its general use.

Dr. Readman gave the results of two comparative trials to ascertain what difference, if any, there was in the fuel consumption when removable non-skid bands were used on the two back wheels, compared with the same wheels uncovered. The road selected for the first trial was an extremely hilly one in Cumberland. In one stretch of 1,184 yards the rise was 280 feet, the gradient going to one in five in places; the total length of the round was 3.51 miles. The speed was maintained as near as possible the same in each trial, and both were made over the same road, in the same direction. A known quantity of motor spirit—more than sufficient to take the car the distance stated—was put into the auxiliary tank, and the quantity left over after the completion of the run was deducted, thus giving the amount actually consumed. The results from the first trials were:

Load three persons; dusty road	Plain tires	Non-skid bands (a)	Non-skid bands (b)
Total distance (miles)	3.51	3.51	3.51
Time (minutes)	13	13.6	13.40
Average speed miles per gallon	16.2	16	15.4
Petrol used (gallons)	.3292	.326	.311
Petrol used per mile (gallons)	.0937	.092	.088
Miles per gallon of petrol	10.6	10.7	11.2

The next two experiments were done on the Penrith to Appleby road, where the conditions, both of surface and gradient, were in strong contrast to the first tests.

Carload four persons; dusty road	Plain tires	Non-skid bands
Total distance (miles	3.1110	3.833
Time (minutes)	8.40	9.7
Average speed (miles per hour)	25.1	22.8
Petrol used (gallons)	1-5th	1-5th
Petrol used per car mile (gallons)	.055	.057
Miles per gallon of petrol	18.1	17.35

Importance of Sturdy Accessories Recognized

Farming as it is done by the makers of automobiles is confined to the parts they are unable to produce (a) as cheaply as they can purchase them (b) with the facilities at their disposal. Accessories are divided into classes as follows:

(A)—Complete car units, as motors, transmission gears, steering gears, live rear axles, front axles, wheels, rims, tires, magnetos, carbureters, radiators, and such other aggregations as are essential to the completion of the chassis independent of the body.

(B)—For the completed chassis, with a view to bringing it up to the user's requirement, the further considerations are by way of bodies, tops and the incidentals for comfort.

(C)—Accessories along necessary lines independent of the chassis and body work include lighting systems, etc.

In the plants where automobiles are made, farming is mostly confined to the production of parts from designs by the makers of the cars, and as a rule, these parts are delivered in dissembled lots to be used as the occasion requires in the assembling of the automobiles. It was thought for a time by some who take an interest in such matters that farming would ultimately pass out of vogue, for two reasons, (a) on the ground that a maker of automobiles can not long afford to allow a portion of his earnings to be absorbed by parts makers, and (b) for the reason that a better quality is to be expected if responsibility is centered. Thus far in the history of the industry it has not been shown that any of the reasons given have much weight alongside of the fact that a maker of specialties becomes skilled in the art, and he must make good because his bread and butter lies in maintaining a satisfactory standard of quality; in other words, the accessory maker has every chance to learn how to do the work rightly and his success depends entirely upon quality.

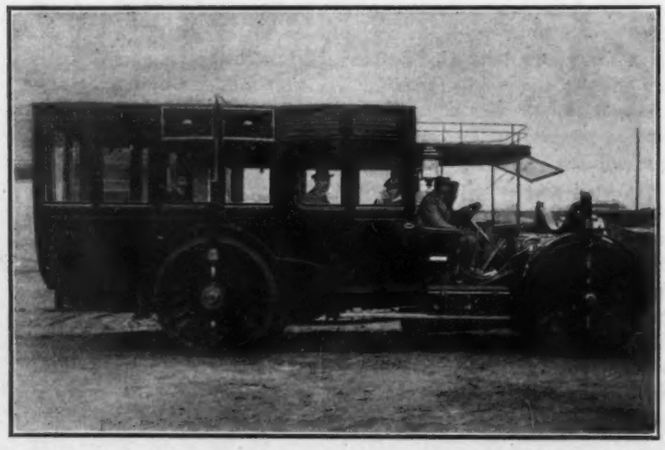
Trying to Abolish the Use of Rubber Tires

Depicting a system which is a radical departure from accepted practice; low center of gravity is one of the aims; how it is realized is shown; suspension is from above instead of from below; large diameter wheels are used; the plan has been given a practical try-out; instead of tires of rubber or steel, a system of leather bandages is used; the scheme looks heavy, but the designer thinks that quantity building will soften this defect.

WITH rubber at a record price and still rising, inventors of spring suspensions, shock absorbers, and other devices intended to abolish the use of pneumatics or to lengthen their natural life, find this the right moment to bring their wares before the public. J. J. Heilmann, a French engineer of considerable repute, has a system which is a radical departure from the standardized method of suspending automobile vehicles. He objects to the small wheels used on automobiles in order to obtain a low centre of gravity; he considers that the overhanging suspension in relation to the vertical passing through the axis of the wheels and the point of contact with the ground is contrary to engineering principles; and naturally he is of the opinion that pneumatics are out of the question where economy has to be considered on heavy commercial vehicles.

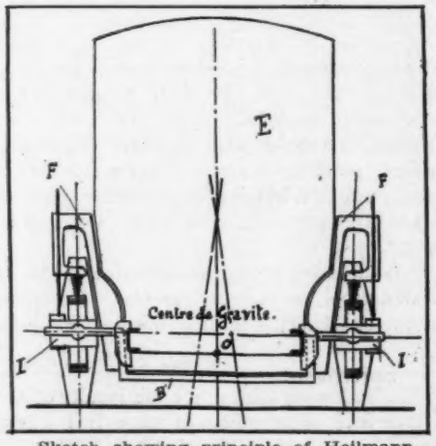
The principle of the Heilmann suspension can be gathered on reference to the figures. The vehicle is no longer carried from below, but is suspended at FF" in the vertical axis of the road wheels, and on their hubs II". The axle, B, is entirely free, merely carrying its own weight, serving to unite the two wheels, and guiding the chassis and the body in fixed grooves attached to the chassis. As the body is not laid on the springs, but is suspended from above, all swinging of the upper portion is abolished. Although the wheels are almost twice the diameter of those usually employed, the centre of gravity is brought down to O, below the axis of the wheels, and the body is as near to the ground as with the ordinary system of suspension. Further, by the interposition of a universal joint in the axle, each wheel can respond to road inequalities without a twisting of the chassis, or in any way affecting the opposite wheel.

Engineer Heilmann has given a practical application to his system on a Pipe six-cylinder chassis, fitted with a handsome 22-passenger saloon body. Very satisfactory experiments have been made, and although some changes will be carried out before construction in series is commenced, these will be of a structural nature only, the principle remaining unchanged. The wheels, as can be seen from the illustrations, are metal ones of very large diameter, with all the suspension in the vertical axis. This consists of two short semi-elliptic springs, one above and one below the hub of the road wheel, and two hydraulic shock absorbers. By reason of the large diameter of the wheels and the various organs of suspension all vibration is abolished. The distance that vibrations have to travel from the rim to the road wheel to the chassis is over 14 feet, compared with an average of 50 inches on automobiles with the usual small diameter wheels and semi-elliptic springs.



Pipe 6-cylinder saloon body by Labourdette of Paris "compound," Heilmann suspension

Neither pneumatic nor solid tires are necessary. The inventor would prefer to use metal bandages, but on account of their side-slipping propensity and the noise they make he has discarded them for a patented compressed leather bandage. This has no resiliency, but it deadens noise and prevents slip. The external appearance of the suspension suggests considerable additional weight, but according to the inventor the system is lighter than wooden wheels, solid rubber tires and semi-elliptic springs, as ordinarily used. Complete with 23 passengers, the Pipe saloon car with the Heilmann suspension weighs from 11,000 to 13,000 pounds, according to the nature of the passengers. When built in series very much weight will be saved, for the first model is almost entirely in cast steel, with a very large safety margin. Steel stampings could be used for most of the metal parts, with, of course, a great decrease in weight. By the use of air buffers Engineer Delpeuch has found it possible to abolish the use of springs, as well as pneumatic tires, for motor vehicles of any size or weight. Briefly, his system consists of four cylindrical air buffers, in place of the four springs. The usual way of converting an ordinary car is as follows for the front suspension: The semi-elliptic springs are entirely dismounted, and the frame members are sawn off about an inch ahead of the front of the radiator. To this projecting end is attached a wrought-iron vertical member, the upper curved end of which receives the head of the cylindrical air buffet. In order that the harmonious lines of the car may be observed the frame to carry the cylinders is a scroll work, generally with one arm made to support the front end of the mudguards. The connecting rod of each piston is bolted to the axle in practically the same way as springs are attached. An effort is made to provide against shock which is more pronounced in this plan than with springs.



Sketch showing principle of Heilmann suspension

Two small tanks, carried within the frame, contain compressed air for the suspension, one tank feeding the two front buffers, and the other the rear ones. The air is put under pressure through a dashboard connection, either by means of a tire pump or a mechanical tire inflator. On the dashboard, also, are two manometers, indicating the pressure in the forward and the rear pair of cylinders, and provided with cocks for passing the pressure from one set of buffers to the other, as desired. Thus it is possible to increase the pressure at the rear and decrease it at the front, or *vice versa*.

The cylindrical buffers are each fitted with a special piston capable of holding compression equal to that usually maintained in pneumatic tires. This is obtained by a piston without compression rings, the nature of the metal being a secret of the

inventor, and covered by a patent. A charge of lubricating oil is placed in the cylinder when fitted, and this is generally sufficient for the normal life of the piston. As a proof of the entire absence of leakage a set of buffers fitted to a car were inflated to the normal working pressure of 5 kilogrammes and left untouched for four months; at the end of this time the loss from all causes was less than half a kilogramme.

Suitable piping, a part of it being flexible rubber tubing, united each buffer to the compressed-air tanks. In the head of the cylinder is an ordinary type of automatic valve which opens in the direction of the tank on the rise of the piston due to a road shock. Immediately on the pressure being released, the valve closes and air begins to pass through a hole in the centre of the valve until the pressure in the buffer has been re-established. In practice, over a rough road, the valve is continually being opened by the repeated road shocks, and just as frequently air is flowing back from the tank to the buffer.

The system has been found so satisfactory that it is possible to do without both springs and pneumatics. The car shown in the illustration is temporarily fitted with pneumatic tires, because no satisfactory solid tire was immediately available. It is found that best results are obtained with a tread of two inches for a medium-sized car, the rear bandage being fitted with diagonal grooves as a preventative of side slip. It is also necessary that the metal rim shall be of such a nature as not to come in contact with the rough ground surface. This type of rim and bandage is now being made specially for the suspension. As a practical test two cars were presented, one with the Delpeuch air suspension, and the other with ordinary springs and pneumatic tires. Experienced automobilists were taken a night ride in both over some of the worst paved streets around Paris, without knowing in which car they were seated. In no case was it found that the air suspension was the less advantageous.

A strong point of the system is that it is possible to vary the pressure according to the load to be carried, or to decrease or increase pressure at front and rear, as is desired.

Technical Tests of the Partington Spring Wheel

COMMANDANT L. FERRUS presents a report on the Partington spring wheel submitted for trial to the Technical Commission of the Automobile Club of France. The wheel is of the type with a rigid rim sliding in grooves fixed on a central hub, also rigid, with the elastic medium placed between the rim and the central hub. Its distinguishing feature is that instead of the elastic medium consisting, as usual, of springs or solid rubber, it is here composed of an air tube. Following the letter references in Figs. 1 and 2, the characteristic of the Partington wheel is the absence of a special organ forming a locking mechanism between the rim G and the hub. This latter is really composed of a complete wheel, the rim of which, A, is undulated. The encircling band, on the contrary, carries a hollow toothed rim, A1 A2, composed of fiber and canvas, the teeth of which, A1, and the hollows A2 correspond respectively to the depressions and the projections of the interior rim, Figs. 1 and 2.

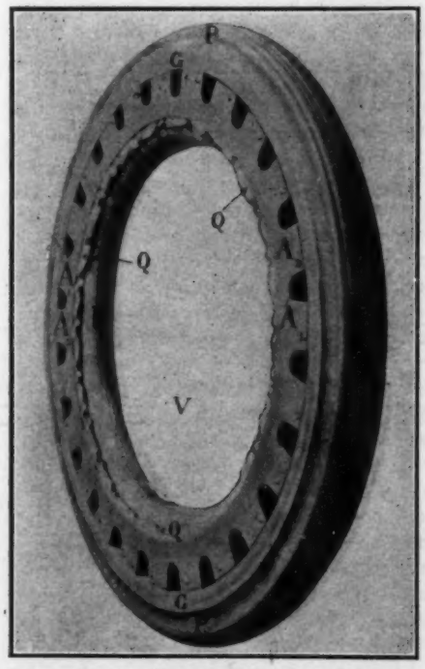


Fig. 2—Partington spring wheel, sectional view

A reinforced air tube, protected by a thick bandage of chrome leather, Q, is interposed between the rim A and the toothed circle, A1 A2 A1 A2. This tube is inflated to a pressure of 5 kilos and enters between the depressions and the projections of the two undulated surfaces, facing one another and makes them into a rigid whole.

Two circular discs are attached by bolts to the rim, and united between them by the bolts which pass through the openings A1, forming a sliding groove for the rim G, and the hollow circle, allowing them to oscillate radially or tangentially between these flasks, while at the same time resting in contact with the air chamber, B. The bolts F limit, in case of necessity, these oscillating movements.

It will be seen that the rim is driven without any difficulty and that the central hub is freely suspended in the interior of the air chamber without transverse rigidity being impaired. When starting the hub turns very slightly in relation to the rim G and the hollow rim A1 A2, bringing them into movement with an elastic motion and without any shock. When stopping or braking, an inverse movement takes place. It is found that starting and stopping take place without any shock. No displacement of the air chamber takes place by reason of the large number of teeth in the two rims. Any such movement would tend to tear out the valve, and tests have shown that the valve is not in any way affected. The flexibility of the bandage is very satisfactory. On an indifferent or really bad road it is equal to that of a pneumatic tire. On an ordinary road, and especially on one with few rough places, there is less flexibility than with a pneumatic tire, for this wheel does not "absorb" small obstacles; the car holds well to the road, even at high speed and on turns.

Objections are that the wheel is rather heavy, and that this may have an ill effect on the axle stubs; this difficulty should be overcome by better methods of construction. Price is high, but is compensated by the lower cost of upkeep. Due to wear the air chamber may not remain air tight. These objections, however, appear to be more theoretical than real. — *Bulletin Officiel de la Commission Technique de l'Automobile Club de France*, April, 1910.

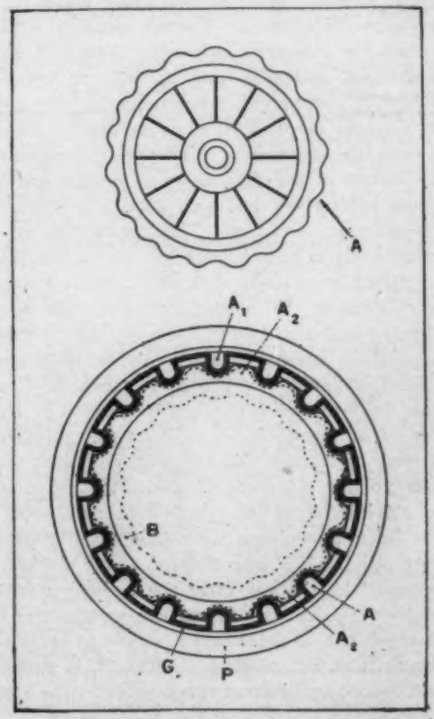


Fig. 1—Partington spring wheel

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

Throttling and lubrication in revolving-cylinder motors——Gasoline motors with reserve power——The possibilities for developing them——The Gore construction——Nervous or soft motors——Their torque and their wear——More light on concentric valves.

Comparing the Gnome and the Adams revolving motors, Eric Walford gives credit for the early conception and practical work of the Adams-Farwell construction and finds them similar in principle. While the greater lightness belongs to the Gnome, the Adams has important constructive advantages. The power of the engine is controlled by varying the compression. A lever permits the adjustment of the inlet cam with relation to the revolving engine. For full power the cam operates as usual, but otherwise the inlet valve remains open during part of the compression stroke, so that part of the gas is blown back in the inlet pipe and less is compressed. This has the advantage that, when the engine is throttled down considerably, the pressure within the cylinders does not fall very low on the suction strokes, as in ordinary engines, and the lubricating oil will not be liable to be drawn past the piston rings into the combustion chamber. By this provision one of the great difficulties of revolving motors seems to be obviated in the Adams type. It has no exhaust pipe or muffler, but auxiliary exhaust ports at the bottom of the stroke break up the exhaust into two portions and reduce the noise. The gas is not fed into the crank chamber, as in the Gnome, but into an induction chamber and thence through five radial inlet pipes to the tops of the cylinders, so that this engine does not resemble the radial-flow turbine as much as the Gnome, in which the gas travels radially outward through valves in the piston head, and then expands inward, passing outward through the cylinder heads again on the exhaust stroke.—*The Autocar,* June 4.

Not the flexibility but the reserve power of the steam engine is the envied feature with which designers of gasoline motors have recently been trying to endow their creations. There is after all sufficient flexibility and suppleness in a six-cylinder or an eight-cylinder engine or in a four-cylinder engine of the two-cycle system. But the maximum value of the mean effective pressure is a strictly limited quantity obtained only when the cylinder receives its maximum charge of gas mixture. And the maximum charge is only obtained at low-motor speeds. Above a certain number of revolutions the power of any motor ceases to increase in proportion to its speed. The piston speed is limited by the increasing resistance to aspiration of gas, more than by inertia or the difficulties of lubrication, which, however, also make themselves felt and impose another, but higher, limit to the increase of power. The pressure on the steam piston, on the other hand, is only limited by that on the boiler walls which may be raised by more intense heat. Now it is a question if the loss of charge at the moment of gas induction could not be suppressed and whether in fact the charge might not be increased beyond the natural cylinder volume, since there is nothing inconsistent in having the charge at more than one atmospheric pressure, by means of a system of forced feed for the gas. The danger of automatic ignition limits the pressure that might be employed, of course. But suppose we admit into a cylinder of one liter volume 1½ liters of gas which we compress three times, or to 4½ kilograms per square centimeter, and in another cylinder of the same volume we admit ¾ liter of gas compressed six times, giving the same pressure as in the first case. The volumes occupied by the gas after the explosion will be identical at the moment the exhaust is opened, and, as the first contained twice as much gas as the other, it stands to reason that the pressure in the first, at the moment of exhaust, is greater than in the other, and indeed as great at the bottom of the stroke as it was at the middle of the stroke in the second cylinder. Consequently, if one has obtained a higher mean effective pressure in the first case, one has also a poor efficiency, since the expansion of the gas has not been well utilized.

There seem to be three possibilities for raising the present maximum power of the motor:

(1)—To find means for introducing a charge reaching a little above atmospheric pressure at the end of admission, even at high speeds.

(2)—The gas admission is not limited but varied according to the power demanded of the motor, while the compression is designed so as to be about normal, 4kg. per sq. cm., when the charge is admitted at atmospheric pressure, and the gasoline is not injected till the moment the explosion is wanted, thus excluding premature ignition when an overcharge has been admitted and the compression consequently raised. The efficiency with this method remains fair, since the conditions are normal for normal operation, and under the forced regimen the resulting overcompression compensates in part for the incomplete expansion.

(3)—The gas admission is not limited, but the volume of the compression chamber is varied so as to have no overcompression or premature ignition. The efficiency in this case is good, so long as the charge remains below atmospheric pressure, but beyond this the incomplete expansion causes a lessened efficiency which, however, is admissible, since the forced march is the exceptional expedient for overcoming exceptional resistance.

The second solution of the problem seems to offer the best averages for all speeds and many designers are working it out experimentally. Nevertheless, it is the first solution which has been taken up successfully in the Gore motor. This comprises five vertical cylinders in a row, working on crank pins 72 deg. apart. A sixth cylinder is the air compressor, which sends air to a tank, whence it goes to the cylinders, passing on the way through a carburetting or gasoline-injector device, but a hand-operated valve on the air conduit permits the operator to shut off the compressed air. The carburetion takes place as follows: The compressed air passes with great speed into a double horizontal cone, siphoning into this cone whatever air can penetrate from the atmosphere by raising a small valve below the gasoline jet (jet and valve both located in vertical tube extending below the cones). A separate oblique needle valve below the valve admits regulation of the air thus drawn in and thereby of the degree of carburetion. So that the compressed air shall not raise all the induction valves at the same time but allow them to remain under control of their respective cams, the inventor has recourse to compensating valves, on the same plan as in Doué's automatic starting device. The holes bored in the cylinders for the guides of the valves are in this motor of a diameter equal to that of the valve, and the valve guides slide in them, while the valve springs are lodged in seats hollowed out in the guides. At rest the latter abut against a portion of the cylinder by means of a flange, but as soon as compressed air enters the admission chamber below the admission valve and surrounding the upper part of the valve stem, the pressure on the top of the guide makes it descend to its seat with a force equal to that which tends to open it by direct air pressure, the lower area of the valve being equal to the top area of the guide, as mentioned.

The inlet cam shaft can be made to slide longitudinally, thereby varying the period of admission for the compressed gas.

Normally, the admission closes at 15 per cent. of the stroke, but at the forced regimen it remains open for 0.30 of the suction stroke. The gas admitted during this period is under a pressure of about 3.5 kg. per sq. cm. and distends during the rest of the suction stroke, till at the end it is at 0.52 of one atmosphere in normal operation, but at 1.05 atmosphere when the motor is forced. In an ordinary motor the pressure on the charge at the end of the suction stroke is about 0.65 atmosphere at 1,500 r.p.m. One may ask if this first compression by a pump followed by expansion in the cylinder and by a second compression in the cylinder does not involve losses. But the first expansion is a motor power and contributes to cooling of the motor. On the other hand, there must be losses in the conduits made necessary by the system. At small speeds, the system gives ten motor impulsions for each two revolutions; namely, five explosions and five admissions of compressed gas. To complete the analogy with a steam engine, the Gove motor has, besides the cams of varying profile permitting variable duration of gas admission, also double admission and exhaust cams permitting the engine to be reversed. The starting of the motor is automatic. It is only necessary to open the shut-off valve for the compressed air and the latter finds the cylinder whose admission valve is open and starts the motor even under load.

The inventor states that a motor of his construction with cylinders 90 by 127 mm. gives 50 horsepower at 1,000 r.p.m. and with a full consumption of 215 cubic centimeters per hp-hour. The mean effective pressure is given as 15.7 kg. per sq. cm., which, however, exceeds the power mentioned by 3-7 kg. Doubtless the inventor is optimistic, as an ordinary motor of his dimensions, with allowance for the large gas charges, should not give more than 42 horsepower at the most.—From reprint in *Automobile-Aviation de Belgique*, June 30.

With reference to concentric valves, of which a comparative study was presented in these columns on June 9 after *La Vie Automobile*, the maker of the Miesse motor and valve offers remarks of general interest in objecting to the reviewer's estimate of his construction. It can not be considered objectionable, he writes, that the valve lift reaches as high as 10 millimeters. The shock on the tappet roller is no more sudden than with ordinary construction, since the projection on the cam is divided in two advances no higher than those of an ordinary cam, and, as to the drop, it is effected at an angle differing considerably from that indicated in the illustration, so that the possibility of fracturing the parts is entirely obviated. It seems at all events simpler and safer to employ a positive mechanical movement for raising the valves than the variable and problematic action of a counter-spring. While the interval between the upper exhaust valve and the intake valve at the bottom contains burnt gases which enter the cylinder again at the suction stroke, this is no more than takes places in all ordinary motors with L. or T. valve chambers, while in the Miesse construction the space referred to is closed between the valves during the explosion stroke and does not affect the thermic efficiency. It is stated that the exhaust valve, whose central location distinguishes this system from all other concentric valve designs, is never cooled. In reality it has been placed where it is precisely with a view to obtaining perfect cooling, and in its position lies the superiority of the system. In none of the other designs does the cooling medium come in contact directly with the seats of the valves or the valves themselves, while in the Miesse the air is driven with great force by the ventilating fan directly against the large exterior valve and its seat; and, besides, the fresh gases lick the exhaust valve seat exteriorly and, as the surface of the valve proper is much smaller than that of the seat which always remains cool, it is readily seen that the cooling is effected much more surely and rationally than in the usual case, where the question is that of cooling the largest of two valves. In other words, it is easier to cool a small than a large valve. In the Miesse motor there is moreover provided an auxiliary exhaust at the bottom of the stroke which notably diminishes the quantity and heat of the gas passing through the exhaust valve.—Letter from J. Miesse to *La Vie Automobile*, June 4.

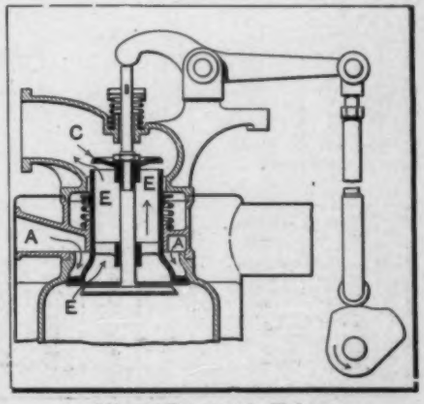
Various methods for blueprints, and a suitable equipment of a modern factory for this purpose are described by Reishaus in *Werkstattstechnik* for April, with drawings of the blueprint machines made by Halden & Co., of Manchester, Eng.

On the subject of "nervous" or "soft" motors, A. Contet, a well-known French engineer, maintains that the distinction, while popular, is devoid of genuine merit and is dictated mostly by commercial considerations. The "soft" motor with the customary short stroke and moderate compression gets all the characteristics of the "nervous" motor at low motor speeds, while the "nervous" motor under an overload forcing it to small speed becomes "soft." The question is one of torque at the various motor speeds. The torque of the short-stroke motor (or 110 by 120 millimeters) of the heretofore ruling design is generally superior below 1,500 revolutions per minute, while that of the long-stroke motor, developing the same power with 85 millimeters bore and 160 millimeters stroke, is superior above 1,500 revolutions per minute. With regard to the bearings of the long-stroke motor, Contet maintains that their rapid wear is simply due to the erroneous practice of using only two bearings for the shaft of a four-cylinder motor, which compels the use of very large diameters and consequently rapid wear of connecting rod bushings, due to the high linear speed. He considers that every "pushed" or "nervous" motor should necessarily be equipped with five crankshaft bearings for four cylinders, so that crackpin diameters may be reduced to their minimum, and that these bearings furthermore should be ball-bearing, so as to give room for widening the connecting rod knuckles and diminishing the pressures per square inch. By this means the pushed motor may be made just as durable in all its parts as the customary type.—A. Contet in *L. V. A.*, June 25.

Valuable articles on steel testing, very elaborate; on electric heating and pyrometry; on case-hardening and on the A2 point in chromium steel, are found in *Engineering* (London) for June 3 and 17.

A method for testing iron and steel shapes for defects by means of corrosion, which quickly lays bare the dangerous formations, is described and proposed by Charles Frémont, engineer, in a quarto pamphlet of 54 pages, with 41 illustrations, published by Dunod & Pinat, Paris; price, 2 francs. The same author has an article on the dynamics of the screw, with special reference to accurate determinations, as for use in dynamometers, in *Revue Mecanique*, May 31.

Referring to a loss of "aerial pilots" making a total of 81, *Motor Car* (June 8, 1910) goes on to say: "Here we get some idea of the commerce done by the different firms, for by looking over this list we find twenty-five H. Farman biplanes, twenty-two Blériot monoplanes, ten Voisin biplanes, nine Wright biplanes, six Antoinette monoplanes, and ten other different types. It is not easy to ascertain the true number of aeroplanes and airships, but the total is about 345, divided amongst the principal countries: England, 20 aeroplanes, 4 dirigibles; France, 190 aeroplanes, 10 dirigibles; United States, 50 aeroplanes, 7 dirigibles; Germany, 15 aeroplanes, 16 dirigibles; Italy, 15 aeroplanes, 3 dirigibles; Japan, 5 aeroplanes, 1 dirigible; Austria-Hungary, 10 aeroplanes, 1 dirigible; Belgium, 8 aeroplanes, 2 dirigibles; Russia, 6 aeroplanes, 2 dirigibles.



Miesse Concentric Valves
(Drop of cam shown too abrupt)

Testing Steel—For Impact, Bending, Etc.

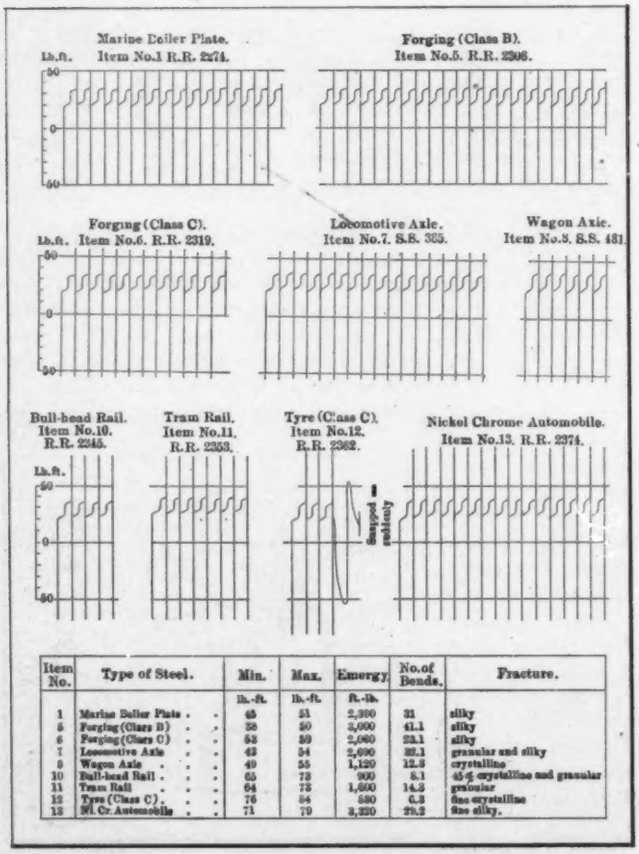
By BERTRAM BLOUNT, W. G. KIRKALDY and Capt. H. RIALL SANKEY

(Fourth Installment)

It was found that the average of 4 test pieces when broken by repeated bending was within 4 per cent.; a greater variation was traced to effect of position; appearance of fracture same as that due to static testing; energy required for rupturing can be calculated; measurements of strength discussed.

FOUR test-pieces were broken for each type of steel by repeated bending, and the average disparity of the various observations from the mean was of the order of 4 per cent.; where greater variation than this occurred it could be traced to the effect of the position of the test-piece; the effect of position is very marked in some cases. The readings of the maximum bending effort of each set of four test-pieces are much closer than those of the bending effort of the first bend. It would appear that the latter depends a good deal on the position of the test-piece and also on the degree of annealing. The effect of the bending is to stiffen the material, and apparently this stiffening tends to a limit; hence a greater uniformity in the readings of the maximum bending effort which agreed within 2 per cent. In the case of the initial bending effort the disparity is as much as 4 per cent. Except in a few cases, the number of bends sustained by each of the four test-pieces of a set agreed within 6 per cent, and the measurement of energy absorbed agreed within the same percentage. In most cases the disparity can be accounted for by the effect of the position from which the test-pieces were taken, but in some there is no apparent explanation. A note was taken of the position of the skin with reference to the direction of bending, but no decided effect was observed.

The appearance of the fractures of the impact tensile tests agreed with those of the static tensile tests. The fractures of the repeated-bending tests had, however, a somewhat different appearance, but no better terms than silky and granular suggest themselves. In addition to these two kinds of fracture, small bright crystalline patches were observed in some cases (see Items Nos. 8 and 9, column 25, Table 2. As a rule, it is possible to find a likeness between the various fractures sufficient to classify them.



Item No.	Type of Steel.	Min.	Max.	Energy.	No. of Bends.	Fracture.
		lb.-ft.	lb.-ft.	ft.-lb.		
1	Marine Boiler Plate	45	51	2,360	31	silky
5	Forging (Class B)	38	50	3,000	41.1	silky
6	Forging (Class C)	53	59	2,060	23.1	silky
7	Locomotive Axle	42	54	2,690	32.1	granular and silky
8	Wagon Axle	40	55	1,120	12.5	crystalline
10	Bull-head Rail	65	73	900	8.1	45% crystalline and granular
11	Tram Rail	64	73	1,600	14.3	granular
12	Tyre (Class C)	76	84	580	6.3	fine crystalline
13	Ni. Cr. Automobile	71	79	3,220	29.2	fine silky.

Fig. 8—Records of repeated-bending tests on nine types of steel

It will be seen that the average of 4 test pieces when broken by repeated bending was within 4 per cent.; a greater variation was traced to effect of position; appearance of fracture same as that due to static testing; energy required for rupturing can be calculated; measurements of strength discussed.

Comparison of the Results Obtained.—Broadly stated, the object of applying a mechanical test to a piece of steel is to obtain information as to its strength, its ductility and the energy required to rupture it. Although the energy required for rupture can be calculated from the ordinary tensile tests it is not usual to do so. In the case of impact tests it is the principal measurement made; in fact, with notched specimens it is the only measurement possible. As regards repeated bending the energy absorbed is automatically recorded by the machine used in these experiments, as already explained.

Measurement of Strength.—Some idea of the strength can be obtained from the impact tests by dividing the elongation into the energy absorbed per cubic inch, i.e., column 13, Table 3, by column 17, Table 2; this has been done and result is given in column 3, Table 3, and the ratio of column 3 to the breaking stress (column 7, Table 2) is given in column 4. There is a fair agreement proportionately, but the strength is exaggerated.

In the case of the repeated bending it is clear that there must be some connection between the initial bending effort and the yield stress, and it is probable that there is also a relation between the maximum bending effort and the breaking stress.

These comparisons are given in Table 3, columns 5 and 6, and it will be seen that as regards the yield stress and initial bending effort the average ratio is 2.1 for steels containing up to about 0.3 per cent. carbon, and it may be stated that practically the same figure has been many times obtained before with steels of similar carbon content. For steels containing more carbon, however, the ratio is greater, namely, an average of 2.7. The nickel chrome steel does not, however, conform to this rule, nor is the agreement good in the case of items 1 and 2. The disparity may, however, be in some measure due to the known difficulty of accurately determining the yield stress. The ratio of the maximum bending effort to the breaking stress is very fairly constant throughout, the average figure being 1.54, and the greatest disparity is 7 per cent.

The meaning is that an approximate idea of the tensile yield stress can be obtained by dividing the initial bending effort by the 2.1 in the case of mild steels (below 0.3 carbon) and by 2.7 for stronger steels. In all cases the tensile breaking stress can be calculated to a fairly close approximation by dividing the maximum bending effort by 1.54. These results are also shown diagrammatically in Fig. 9.

Measurement of Ductility.—The impact-tensile test gives elongation and contraction of area, and it is to be noticed that the figures are in all cases greater than those obtained with the static tensile tests of the small specimens. As regards elongation the probable explanation is that the suddenness of the breaking effort tends to produce a more general extension. In the repeated-bending test the number of bends increases with the ductility, and in order to establish a comparison with the ductility as evidenced by the tensile tests, the ratio of the number of bends to the elongation,* to the contraction of area, and to the product of the elongation and the contraction of area have been computed with the results given in columns 8, 9, and 10, Table 3. It will

* In order to make a true comparison the elongation for a gauge length of $4\sqrt{A}$ has been computed from elongations given in columns 8 to 12, Table 2. A is the area of the cross-section.

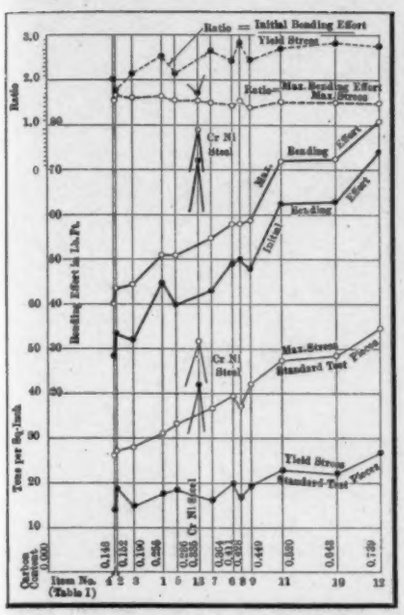


Fig. 9—Comparison of repeated-bend tests with tensile tests

be seen that the ratio varies somewhat in the first two cases, but is fairly constant in the last (column 10). It may be said therefore that the number of bends is proportionate to the ductility as obtained by the static tensile tests. These results are also shown diagrammatically in Fig. 10.

Measurement of Energy Absorbed.—A comparison of the energy absorbed in rupturing the test-pieces by the three different methods of test is given in columns 11 to 17, Table 3. In the static tensile tests the formula used is:

$$\text{Energy per cubic inch} = \frac{\text{elongation}}{\text{gauge length}}\left(\frac{2\,\text{breaking-stress} + \text{yield-stress}}{3}\right).$$

This formula assumes that the top of the stress-strain diagram is sensibly parabolic in form, and it was originally proposed by Sir Alexander Kennedy. The calculation has been made both for the small and for the standard test-pieces; in the latter case the elongation for a large test-piece geometrically similar to the small test-piece was computed. It will be seen that the energy per cubic inch absorbed by the large test-piece is in all cases smaller than by the small test-piece.

It will be further noticed that the energy absorbed per cubic inch in the impact tensile test is considerably greater than in the static tensile test, the ratio being approximately 1.6 (see column 14) which may be due to the suddenness of the action.

On examining the broken repeated-bend test-pieces it was found that the whole of the metal was profoundly disturbed for about 1.3 inch of its length (varying from 1.1 to 1.5). The energy per cubic inch can, therefore, be calculated approximately, and the result is given in column 15, Table 3. It will be observed that the figures in most cases are of the order of five to ten times greater than those for the static tensile tests (standard specimens, column 12). In the case of the latter, however, the far greater portion of the metal is only distributed to the extent due to the yield stress (even if so much), and it is only close to the actual fracture that it is fully disturbed, whereas in the bending test, as already pointed out, nearly the whole of the test-piece is profoundly disturbed. An estimate of the energy absorbed in the neighborhood of the point of rupture in the tensile test can be obtained as follows: The energy absorbed per cubic inch by the general extension can be found by establishing simultaneous equations based on the elongation on 2 inches and on 3 inches given in columns 8 and 9, Table 2. To this must be added the energy per cubic inch required close to the point of fracture by the additional disturbance there. A cubic inch, consisting of a cylinder 1 square inch area and 1 inch length, will be deformed into a cylinder whose cross-section is that of the contracted area. The elongation of this cylinder is, therefore:

$$\frac{1}{1-\text{contracted area}} = 1$$

and the force acting is the breaking stress. This energy can therefore be calculated and added to that due to the general elongation. The result is given in column 16, Table 3, and the ratio of the energy required by repeated-bending to this energy is given in column 17. It will be seen that the ratio is fairly constant, and roughly the energy per cubic inch required by repeated bending is twice that needed by a static pull at the point of maximum disturbance. This appears reasonable seeing that the alternate tensions and compressions to which the metal is subjected in repeated bending produce an irreversible action, so that the energy required is likely to be considerably greater than that needed for a simple pull. An interesting point to note is that the variation in the energy absorbed per cubic inch, both in the static tensile and in the tensile impact tests, does not greatly vary with the different types of steel; whereas in the repeated-bending very marked differences occur. These results are also shown diagrammatically in Fig. 11.

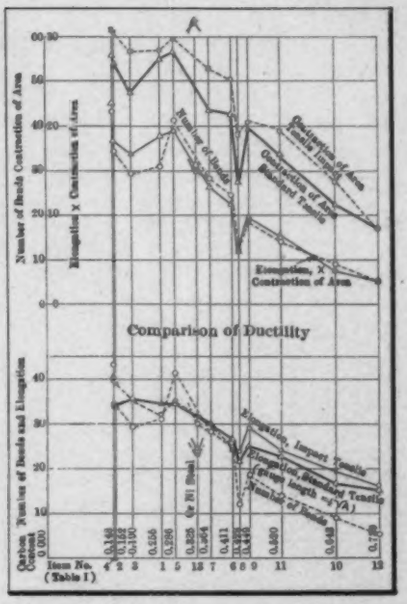


Fig. 10—Comparison of ductility by static tensile, impact tensile and repeated bending

The results of the impact tests are similar to those obtained by the static tension test, and this agrees with similar tests made by M. P. Breuil and others, but it would appear from these latter tests that in the case of steels containing an undue percentage of phosphorus much lower results are obtained by the impact method than by the static method. Such steels were, however, not included in the original scope of experiments.

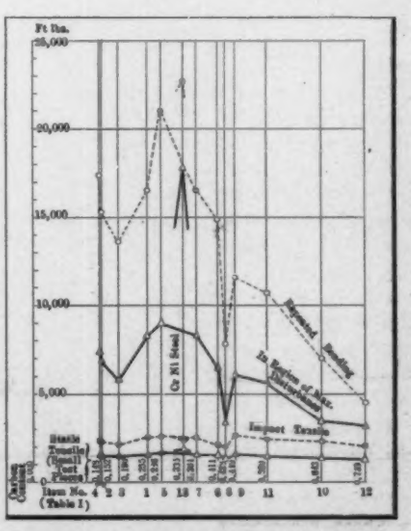


Fig. 11—Comparison of energy absorbed per cubic inch of metal by static tensile, impact tensile and repeated bending

Summary

1. The static tensile test forms a standard of comparison, and gives the strength and ductility of a sample of steel in terms which are well understood. The average energy absorbed per cubic inch can be computed, but does not vary greatly, and, therefore, does not assist in discriminating between the various types of steel.

2. The impact tensile test gives the ductility in the same terms as the static tensile test, namely, elongation and contraction of area, but always with higher numerical values. The breaking stress of the material can be inferred, but must be reduced by a factor in order to obtain the same numerical values as given by the static test; also it only gives the breaking stress. The energy absorbed per cubic inch does not vary greatly with the various types of steel; it is approximately 50 per cent. more than that obtained by the static tensile test, and is also no definite criterion of the type of the steel; at any rate, of normal steels containing a small proportion of phosphorus. From the experiments referred to by M.

Breuil it would appear that steels containing an undue proportion of phosphorus give a much smaller energy per cubic inch with impact tensile tests.

3. The repeated-bending test gives strength, ductility and energy, but in terms different to those obtained by the static or the impact tensile test. Strength in the same terms as the static test can be inferred as follows:

The yield-point expressed in tons per square inch can be obtained by dividing the initial bending effort, expressed in lb.-ft., by 2.1 for mild steels, namely, those containing less than 0.3 per cent. of carbon, and 2.7 for medium carbon steels. The breaking stress in tons per square inch can be obtained by dividing the maximum bending effort, expressed in lb.-ft. by a factor 1.54 for all types of carbon steel. The ductility of the steel is given in different terms to those in which it is expressed by the static tensile test, namely, the number of bends, but the product of elongation on a gauge length of $4\sqrt{A}$ multiplied by the reduction of area is equal approximately to the number of bends divided by 1.9. The energy expressed in ft.-lb. per cubic inch required for breaking by repeated bending varies considerably, and is a characteristic of the type of steel.

The paper is illustrated by eleven figures in the letterpress and is accompanied by an appendix.

APPENDIX

The following is the calculation that has to be made to obtain the energy absorbed by the tensile impact test. As given on page 53 (July 14 issue), the formula is:

$$\text{Energy absorbed} = W\left\{H - \frac{1}{2g}\left(\frac{h}{t} - \frac{gt}{2}\right)^2\right\}$$

but since in almost every case the height of fall H was 30 feet, and the fall after fracture h was 10 feet, this formula can be reduced to:

$$\text{Energy absorbed} = W\left(35 - \frac{1.553}{t^2} - 4.035t^2\right)$$

Test-piece No. 307, taken out of locomitive plate not subjected to flame (Item No. 3), will be taken as an example; in this case $W = 20$ pounds and the tape record gave $t = 0.365$ second.

Hence:

$$\text{Energy absorbed} = 20\left(35 - \frac{1.553}{(0.365)^2} - 4.035\ (0.365)^2\right)$$

$$\text{Energy absorbed} = 20\ (35 - 11.64 - 0.53)$$

$$\text{Energy absorbed} = 456 \text{ foot-pounds.}$$

The error in determining the energy absorbed in rupturing a test-piece by tensile impact depends on the error in the time measurement, and also on the ratio between the energy absorbed in breaking the test-piece and that remaining in the tup immediately after fracture.

If δ is the error in the measurement of the interval-time, it can be shown after some reduction* that the percentage of error in the value calculated from the above formula is:

$$\frac{2\delta K}{1 - K^2}\left\{\sqrt{\frac{h}{H} + K^2} - \frac{\delta}{2}\left[\frac{h}{HK} + 2K + \sqrt{\frac{h}{H} + K^2}\right]\right\}$$

where K is the ratio of the velocity of the tup immediately after rupturing the test-piece to its velocity immediately before impact, hence $1 - K^2$ is the ratio of the energy absorbed to the energy in the tup immediately before fracture.

The following numerical examples, set out in a tabular form, will show the per cent error in the energy measurement for various values of K when $\delta = 1$ per cent. and 4 per cent., respectively. In all cases $H = 30$ feet and $h = 10$ feet.

Value of K	Ratio of energy absorbed to energy in tup immediately before fracture $1 - K^2$	Error in energy measurement $\delta = 1$ per cent. Per cent.	Error in energy measurement $\delta = 4$ per cent. Per cent.
0.2	0.96	0.25	0.93
0.4	0.84	0.66	2.50
0.6	0.64	1.5	5.8
0.8	0.36	4.3	16.5

With lower falls (H) the error is somewhat greater, with higher falls it is somewhat lower. It is obvious, therefore, that K should not exceed 0.5 in order that the error in the energy measurement should not exceed the error in the time measurement; that is, the velocity after impact should not be greater than half the velocity immediately before impact.

Storage of Benzin

The increasing use of benzin as motive fluid for automobiles, motor boats and self-propelled dirigible airships—to say nothing of its employment as a solvent of india rubber, and its use as a menstruum for paints—makes anything tending to diminish the undoubted danger attending its storage and use of special interest. The liquid in question is, as all know, "water white"; but all do not know that its boiling point lies at from 105° C. = 221° F. down to as low as 80° C. = 176° F. Just what "benzin" is depends very much on the custom of the trade on the one hand, and the orders of the petroleum refiners on the other, for other products that pay better. The flash-point of this liquid, as ordinarily known in the automobile branches of industry, is about 21° C. = 69.8° F. The danger attending its use arises, not from its low flash-point, but from the fact that with air it forms an explosive mixture, when present in quantities lying between 2.8 and 4.4 volume per cent.

In 1893 Richter made a number of experiments as to the explosibility of this material, and found that up to that time its unexplained spontaneous ignition was due to its electric excitability. By the addition of salts of oleic acid (antibenzinpyrin) this danger was done away with. In 1899 the Society for Vessels that are Safe from Explosions, Salzkotten, produced vessels surrounded by wire gauze, so as to act on the principle of the Davy lamp, and the employment of such receptacles enables pouring benzin or other similarly explosive fluids into the fire without an explosion taking place. These receptacles are not, however, safe against lightning.

By filling one vessel with benzin from another, by means of compressed air, many explosions have been caused. To do away with this danger it has been recommended to use cold gaseous products of combustion. A further step in the direction of safety was made by the use of carbonic acid gas to produce the required pressure. According to Prof. Lunte, the addition of only 12 to 13 per cent. of this gas to an explosive mixture of benzin and air will render it harmless. One form of apparatus for storing and handling benzin has a tank for the benzin and a vessel of compressed carbonic acid gas; and between them a safety chamber buried in the earth.

Another safety arrangement, that of Grümer & Grimberg, in Bochum, permits the use of compressed air as a medium of transfer. It consists of a riveted boiler-plate receptacle, which is always out of the reach of fire (being buried in the earth), and from which the benzin is forced into the smaller vessels to be filled, by throwing into the connections a supply of compressed air. There is a steel tank of compressed carbonic acid, from which the gas is forced under very slight excess of pressure into all part of the piping and receptacle, so that the development of an explosive mixture of benzin vapor and air is impossible. An automatic safety appliance renders impossible any false arrangement or handling of the apparatus by carelessness. The quantity of carbonic acid gas necessary is very slight. An excess of pressure of one-tenth of an atmosphere is sufficient to insure the entrance of the gas into all parts of the piping and that part of the main receptacle not filled with benzin.

*This investigation was made by Capt. C. E. P. Sankey, R. E.

Automobile Accidents and "Autlers"

GERMANY has for some time past kept statistics concerning the number, kind and cause of automobile accidents, and results show that a large proportion of these—some of which were very severe—were due not to the speed at which the car was traveling, but to the foot passengers or others who were injured. Regierungsrat Dr. Haaselau had an article in *Der Tag*, of Berlin, calling attention to the almost incredible carelessness of foot passengers in regard to motor cars, and further, to a group of accidents in which the occupants of the car were injured and the driver alone was to blame, not by reason of speed, but because of his incapacity. There are drivers—both car owners and employees—with whom one feels absolutely safe at 60 miles an hour, and who have never had an accident.

As a parallel case, the author cites a second-class trapeze "artist," who would attempt to perform first-class feats, but who would be in constant danger of his life, because his physical elasticity was not equal to doing that which a first-class performer would easily perform. It is the same thing with motorists. Besides technical education, natural ability or adaptability, presence of mind and good nerves are of great importance as regards the degree of perfection or skill in handling a motor-car. There are drivers who can direct a car at 20 miles an hour with perfect skill, and at that speed are perfect masters of the situation, but as soon as they increase the speed in any degree are unsafe, and in a tight place they funk.

"How is this evil to be done away with?" inquires Dr. Haaselau. To do this by police regulations, setting a limit to the speed at which any given driver may conduct his car—as is the case in many towns in England—is impracticable. For instance, in many cases the limit is set at a point corresponding to the average ability of the drivers, namely 10 miles per hour, which reduces the whole ability of the automobile to that of the horse-driven vehicle. This completely shuts out the possibility of the use of the car in such towns.

Dr. Haaselau is of the opinion that better education and more experience should be demanded of the driver. The existing schools have, with few exceptions, no interest other than to turn out the maximum number of "chauffeurs" in as short a time as possible. They assume no responsibility for the subsequent performance of their pupils. Even the testing of their capabilities by experts offers no security, being not sufficiently thorough, and largely dependent on chance. The "chauffeur's" training should take place in schools having no pecuniary interests in turning out drivers, and should be, if possible, conducted by the municipal authorities, so that the official examination could take place at the end of each course.

Here unsuitable elements could be weeded out in time. The pupils would also be taught the dangers of high speeds. Drivers from such schools would naturally have the preference among car owners, and the time would come when none but such would be employed.

Imports of Automobiles Into Russia

The importation of vehicles of all kinds into Russia increases each year. In 1906 the total value was only 1.8 million roubles; 1907, 3.5 millions; 1908, 5.1 millions. This development is principally due to the growing demand for automobiles. In 1904 and 1905 the importation amounted to only 100,000 roubles each; in 1907, however, 1.6 million, and in 1908 to 3.1 million roubles. Preference is given to large cars with four to six seats. Of these, in 1908, there were 2.8 million roubles' worth bought abroad; of the smaller ones, only 0.3 million. The Russian automobile manufacturers have made only slight progress in 1908. Most of the work in this line consists in assembling parts bought abroad, and in the "carosserie," or carriage-making proper. These factories have, however, but limited custom. For expensive cars only French makes are preferred, while the German ones are taken for heavy passenger cars and for omnibuses. But the German manufacturers are making every effort to push the sale of their more expensive makes in Russia. In the automobile races, which take place once in a while, most of the cars are German. That they are better suited to the miserable Russian roads than the French has been shown by the recent races between St. Petersburg and Riga. The increasing importance of Russia as a market for automobiles has also brought American manufacturers on the scene. These strive specially to push the sale of the cheaper sorts, but by reason of their cheapness, says the German consul in St. Petersburg, they do not appear to be very desirable.

Coming Events in the Automobiling World

Dec. 1.....Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11. Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories Exclusively.
Feb. 6-Feb. 11, '11. Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

July 18-23.....Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 23.....Atlanta, Track Meet, Atlanta Automobile Association.
July 23.....Brighton Beach, Track Meet, Motor Racing Association, New York City.
July 25-26-27.....Cleveland, O., Reliability Run, Cleveland, Ohio, News.
July 25.....Chillicothe, O., Track Meet, Chillicothe Order of Owls.
July 30.....Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
July 30.....Long Island Motor Parkway, Track Meet.
Aug. 1.....Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5.....Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 11.....Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 16.....Start of Munsey Tour.
Aug. 17.....Cheyenne, Wyo., Track Meet.
Aug. 31.....Minnesota State Automobile Association's Reliability Run.
Aug. 31-Sept. 8...Kansas City, Mo., Reliability Run, Auto Club of Kansas City.
Sept. 2-5.....Indianapolis, Ind., Speedway Meet.
Sept. 3-5.....Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5.....Wildwood, N. J., Track Meet.
Sept. 17.....Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept. 24.....Santa Monica, Road Race, Licensed Motor Car Dealers of Los Angeles, Cal.
Sept.....Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1.....Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3.....Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8.....Santa Anna, Cal., Track Meet.
Oct. 7-8.....Los Angeles, Cal., Speedway Meet.
Oct. 8.....Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15.....Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18.....Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.

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TO enable the user of pleasure cars or of trucks to get along with a small motor and yet have power for emergencies is the object of many experimental efforts among the designers of Europe to-day, and this trend toward economical refinement in automobile motors goes side by side with the bold departures from current practice which are witnessed in the aviation field. Other things equal, the most economical power must eventually prevail here as well as in less favored countries, and for this reason, if for no other, the brief accounts of Europe's feverish experimentation recorded weekly in our Extracts from Foreign Papers, claim the attention of the provident manufacturer. They should help to anticipate and forestall unpleasant commercial surprises. Refinement in constructive thought is Europe's strong point, and eventually there must be a reckoning, once more, between the merits of its practical results and those of our eminently successful refinement in the methods of mass production.

* * *

PREPARATION is rapidly going forward for the great meeting of the automobile engineers, which is to be held at Detroit, on July 28, 29 and 30. Indications point to a large program; many papers will be read, and knotty points will be aired. In addition to these important matters, there will be visits to plants, entertainment of the instructive sort, and, in addition, the great question of standardization of the materials used in automobiles will be earnestly debated. The Society of Automobile Engineers, while it is assured of a full attendance of its large and growing membership, has invited all automobile men to go to Detroit and participate in the doings—a welcome is assured, nor is it necessary to await further invitation. Go to Detroit; have a vacation and enjoy three days of automobile reviewing; even take part in the discussion and add a mite to the progress to be made.

* * *

FORTUNATE to relate, almost every autoist becomes acquainted with his car and its workings, excepting the ignition system, in a very short time. The electrical part of the equipment gives him sleepless nights; nor does he make any effort to cast off the hypnotic spell. There is nothing about an electric system that cannot be mastered by almost any autoist within a few days, and it is too bad that it is not given more attention and a little better care. When a man decides that he does not understand a thing, his inclination is to let it alone, and when an electrical device is neglected, the chances are that it will go awry.

* * *

FANCY free, with money in hand, the man with a penchant for real enjoyment, purchases a good automobile and goes forth to conquer. This is as it should be, and the money expended in enjoyment of this form is actually invested on a dividend paying basis. But this is not all; piano-forte makers are now complaining that even on the pay-as-you-please plan for a more or less good instrument, women are just a little timid—a natural inclination with them—and it is claimed that the automobile pleases them more; being used to having their own way, they get what they think will be of the most benefit, and as men of any wisdom will testify, a woman's judgment is rarely ever far wrong.

* * *

MUSIC and its charms are accompaniments of life that can ill be dispensed with, but it is not believed that it is better to possess a cheap piano on the installment plan than it is to purchase an automobile for cash, and with it learn of the beauties of nature, and fill the lungs with life-giving oxygen. As an economic proposition, should pianos be peddled on the installment plan? Is it economical, speaking in the broader sense, to purchase musical instruments on the installment plan? Is it not better to buy automobiles for cash?

* * *

AGITATION nearly always has the misfortune to be one-sided. The financiers, for illustration, who are so fearsome about the money that is being utilized profitably in automobile work, type their logic and send it forth, hoping that they are the only ones who know how much they need the money in their own enterprises. But they can only imitate that bird of gay plumage, the ostrich, hiding the head of their tale in the sand of piercing public gaze. The real question is, Can these agitators present as sound an investment, and do they offer the future with all its security that the automobile presents? The record of the automobile industry is clean; no battery of telephones was ever used in a "thimble rigging" process to bolster it up. It requires no such support. How about the methods of the interests that are decrying the automobile? Are their escutcheons without a splash of the blood of murdered enterprises?

New York State in Throes Due to Callan Law

CHAUFFEURS, of whom there are upwards of 35,000 in New York City and vicinity, are being introduced to the intricacies of the new Callan law. The Secretary of State, through his publicity agent, has been leading the public to believe that chauffeurs would be given a regular and comprehensive examination under the direction of a corps of capable examiners headed by a chief examiner whom the public could rely upon in every particular. To what extent the Callan law is a good one remains to be seen. The autoing public, however, assumes the attitude of a "first night" audience. In some respects the situation does not look promising; there are but a few days available for the examination of chauffeurs, and up to the present time but a small proportion of them have been accommodated.

* * *

JUDGING by the character of the publicity which is alleged to emanate from the office of the Secretary of State, a chauffeur is a man who must be fettered. It was said that a rigid examination would be instituted, and that the chauffeur of no competence and small respect for law would be eliminated. As it stands at the present time, it would be impossible to give a comprehensive examination to the chauffeurs were they to apply for same and appear, as they have a right to, within the few fleeting days before the law dates to go into effect. If the Secretary of State is trying to "mould" public opinion, and if he thinks it can be done by flooding the press with hollow publicity, it is feared that the average autoist has enough civic intelligence to permit of generously disagreeing with him.

* * *

FAIRNESS demands more than criticism, and the idea that Senator Callan is a mere "chestnut puller" must include the assumption that he hopes to please such of our citizens as are afflicted with a disease called "Autophobia," and that he thinks the rest of the public is so dull that it will be herded to the polls by the "machine" despite the fact that the users of automobiles in the State of New York will have to pay $2,000,000 for the privilege, which, according to Governor Charles E. Hughes, is the size of the hole in the budget that autoists are expected to stop up. This is scarcely possible.

* * *

CHARITY, with its broad mantle, is said to be sufficient to cover a multitude of sins, and assuming that it has the characteristics of caoutchouc, it may be utilized to advantage in the further effort involving the Callan Act. How this mantle will be rendered sufficiently expansive, however, to hide some of the defects of this law is the problem which confronts plain citizens. Quite a few autoists would like to know by what constitutional right legislative power can be delegated to the Secretary of State. Under the Callan Act chauffeurs must be licensed by the Secretary of State, but the methods involved in the process of licensing this class are not prescribed in the law itself, but the Secretary of State is empowered (according to this law) to prescribe conditions. It is left to him to arbitrarily establish the qualifications that shall be required. Is this not legislative power?

* * *

IT is prescribed in the new law that no new licenses shall be granted where one has been suspended or revoked, unless the discretion of the Secretary of State authorizes it. Does the Secretary of State get his right to legislate (as here indicated) by virtue of "Senator" Callan's 25-year-old acumen? According to this law, and the interpretation alleged to be put upon it by the Secretary of State, no license will be issued to a driver of known recklessness. Why should the taxpayers of New York support a large body of respected Justices if it is no longer necessary to try a man for an offense and convict him by due process of law? When did the Legislature acquire the right to manufacture retroactive law?

* * *

TAKING up the question of fees, they are graduated according to horsepower in lieu of all taxation. Did the "Senator" in his desire to work into the good graces of his constituents overstep the bounds? Does he think it is constitutional to exempt automobiles and not exempt other vehicles?

* * *

DOES the "Senator" think that autoists will appreciate the exemption from taxation as it is written in the law? True, the automobile is exempt from taxation, but the cost of the exemption clause is $2,000,000. Is the "Senator" worth $2,000,000 a year to the owners of automobiles in the State of New York? It would be interesting to hear from a few thousand more autoists on this point, or, better yet, it would be worth knowing just how liberal they do feel. Certainly they can find no ground for assuming that the "Senator" may not ultimately give them another exemption at a cost of $2,000,000 more.

* * *

WHEN the new law was framed, and the claim was made that drivers of automobiles should be compelled to indicate that they are capable, if the foundation of the new law was fundamentally right, was it not a fair inference that the examiners should show their capability before they were licensed to examine? Can the blind lead the blind? Are the people of the Empire State likely to receive any additional protection from reckless chauffeurs through an examination conducted by examiners who are not required to pass an examination themselves? Would it not be just as reasonable to appoint bartenders as examiners, or men who are quite familiar with the inner workings of a jail, as it is to make political appointments to fill the examiners' chairs, when, as a matter of fact, the examination to be of any value must be technical?

* * *

WHEN the necessity arose for a revision of the law as it related to the automobile, the politicians who had the matter close to their hearts voiced a sentiment which sounded like sweet music, contending that the fees for licensing should be dissolved in road building. Every autoist knows that a good road is a money-maker for him, that if the road is in a bad state of repair his automobile will catch the disorder just as smallpox spreads through an improvised camp, and with one accord the automobile users, backed by the manufacturers, supported the issue. They could not have foreseen that any politician would be so short-sighted as to abandon a good position and go the length of transferring the money returns to the General Budget, thus destroying every reason for worming cash out of a man's pocket simply because he rides in an automobile.

* * *

GOOD roads are recognized as a necessity, not only for the automobile, but for every other vehicle as well. The farmer knows the value of a good road leading from his front door to the market square in the nearest town, and the modern farmer finds it to his advantage to resort to methods of "intensive cultivation," which methods are incomplete in the absence of "intensive transportation." The modern farmer shows by his progressive acts that he knows these things, but it is a question if the lawmakers have kept pace with progressive farmers, and it is believed that the framers of the Callan law, instead of pleasing the farmers and hoodwinking the rest of the people, have pleased no one, and it remains to be seen if they can hoodwink any one.

A. L. A. M. Files Decree in Long-Pending Selden Suit

Judge Charles M. Hough Acts in Favor of Complainants

Ford Lawyers Contend for Bond Rather than Injunction

A TENTATIVE decree covering the salient points in the opinion rendered by Federal Judge Charles M. Hough in the suit of George B. Selden and the Columbia Motor Car Company, exclusive licensee under basic patents granted to Mr. Selden for improvement in road engines, was filed with Judge Hough July 19 in the parlors of the New Mathewson Hotel at Narragansett Pier.

The decree submitted was that drawn by Frederick P. Fish and Samuel R. Betts on behalf of the complainants and under its terms the Columbia Motor Car Company is installed formally as party complainant to the suit and substituted for the Electric Vehicle Company, which instituted the action. It holds that George B. Selden is the legal inventor of the gasoline road engine and that the defendants, the Ford Motor Company and C. A. Duerr and Company, representing the Panhard Motor Company, had been guilty of infringing sections 1, 2 and 5 of the letters patent.

It holds that the complainants are entitled to recover the profits, gains and advantages that have accrued to the defendants by reason of the infringements and orders the whole matter to be reported to a Master of the Court to take account of the measure of damages that shall be taxed.

The decree also provides that a perpetual injunction issue against the defendants, prohibiting them from continuing to infringe the patents.

Besides Messrs. Fish and Betts, George B. Selden and Alfred Reeves appeared on behalf of the complainants and Edmund Wetmore, W. Benton Crisp, Frederick R. Coudert, James Cousins and Charles K. Offield represented the defendant companies.

The question of issuing an injunction was sharply contested by the defendants, who asserted that if an injunction was to issue pending an appeal of the cause to the Federal Court of Appeals, a substantial injustice would be worked to the interests of the 4000 men employed by the Ford Motor Company with its big factory and seventeen branch houses. It was urged that the defendants were quite as anxious as the complainants to bring the matter to a final decision, and for that reason the suggestion was made to the Court that a sufficient bond to cover damages and profits might better be required pending such final decision.

Complainants' attorneys in discussing this phase of the matter mentioned the figures of $500,000 as the size of the bond to be filed by the Ford Company and $50,000 by the Panhard Company.

Whether the issuance of such an order will be made is problematical and will not be known in the immediate future because the decision of Judge Hough as to the exact form of the decree is still under advisement.

The Court is in vacation at present and Judge Hough was visiting Narragansett Pier for the purpose of addressing the Sixteenth Annual Convention of the Commercial Law League of America.

The proceedings of the case will come up for final review and an ultimate decision in October before the Court of Appeals. A preferential position for the matter has been secured on the calendar of that Court.

The full text of the decree submitted follows:

At a stated term of the United States Circuit Court for the Southern District of New York, held in and for said district on the Nineteenth day of July, 1910. Present Hon. Charles M. Hough, Judge. The Columbia Motor Car Company and George B. Selden, Complainants, vs. C. A. Duerr & Company and Ford Motor Company, Defendants. In Equity No. 8566 On Selden Patent No. 549,160.

This cause having come on for final hearing upon the original pleadings, and the proceedings, and the testimony and the proofs filed on behalf of both parties, and having been orally argued before the Court on the issues raised by said pleadings and proofs on the 28th and 29th days of May and the 1st, 2d, 3d, and 4th days of June, 1909, by Frederick P. Fish, William A. Redding and Samuel R. Betts, counsel for complainants, and R. A. Parker and W. Benton Crisp, counsel for defendants, and an opinion herein having been filed by His Honor, Judge Hough, on September 15, 1909, and this cause thereafter having come on to be heard on the supplemental bill and answer and replication, and the proceedings, and the testimony and proofs thereunder, filed on behalf of both parties, and having been orally argued before the Court on the issues raised by said supplemental pleadings and proofs, on the 19th day of July, 1910, by Frederick P. Fish and Samuel R. Betts, counsel for complainants, and Edmund Wetmore and W. Benton Crisp, counsel for defendants, now, after due proceedings had, it is, upon consideration, ordered, adjudged and decreed as follows:

1. That the Columbia Motor Car Company, as an assignee of Electric Vehicle Company, be and is hereby made a party complainant to this suit in the place and stead of said Electric Vehicle Company, and is hereby given the same benefit of the record and proceedings herein, and of any decisions, orders or injunctions heretofore or which may hereafter be granted against the defendants herein, as the said Electric Vehicle Company, or its Receivers, or either of them might have had, if they had not made the assignments dated June 30, 1909, to said The Columbia Motor Car Company. That the said the Columbia Motor Car Company is hereby authorized to continue the prosecution of this suit with George B. Selden, patentee of the letters patent proceeded on herein, against the defendants, as of the 30th day of June, 1909, and as a complainant therein in the place and stead of said Electric Vehicle Company.

2. That the letters patent of the United States issued to said George B. Selden on November 5, 1895, No. 549,160, for Improvements in Road Engines, are good and valid in law as to the first, second and fifth claims thereof, being the claims proceeded on in this cause, and which are as follows:

"1. The combination with the road-locomotive, provided with suitable running gear including a propelling wheel and steering mechanism, of a liquid-hydrocarbon gas-engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described.

"2. The combination with a road-locomotive, provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid-hydrocarbon gas-engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body located above the engine, substantially as described.

"3. The combination with a road-locomotive provided with a propelling wheel, of a liquid-hydrocarbon gas-engine of the compression type, comprising two or more working cylinders and pistons arranged to act in succession during the rotation of the power shaft, a suitable liquid fuel receptacle, suitable devices for transmitting motion from the power shaft to the driving axle, and a clutch or disconnecting device, substantially as described."

3. That the said George B. Selden was the sole, first and original inventor and discoverer of the inventions described in said Letters Patent, and claimed in the said first, second and fifth claims thereof.

4. That the said George B. Selden, complainant, is the owner of the legal title to said Letters Patent, and that the complainant, The Columbia Motor Car Company, is the exclusive licensee thereunder, with power to grant sub-licenses.

5. That the defendant Ford Motor Company has infringed upon the said Letters Patent and said claims 1, 2 and 5 thereof, and upon the exclusive rights of complainants under the same, by manufacturing, using and selling, in the United States, within the Southern District of New York and elsewhere, without right or license, road engines, vehicles or gasoline automobiles containing, embodying or employing the said inventions and improvements described in said Letters Patent and claimed in the said first, second and fifth claims thereof; and that the defendant, C. A. Duerr & Company, has infringed upon said Letters Patent and the said claims 1, 2 and 5 thereof, and upon the exclusive rights of complainants under the same, by using and selling in the United States, within the Southern District of New York and elsewhere, without right or license, road engines, vehicles or gasoline automobiles containing, embodying or employing the said inventions and improvements described in said Letters Patent and claimed in the said first, second and fifth claims thereof.

6. That the complainants do recover of the defendants the profits, gains and advantages which the said defendants have derived, received or made by reason of the said or any infringement by the said defendants of said claims 1, 2 and 5 of the said Letters Patent; and that the said complainants do also recover of said defendants any and all damages the complainants or their assignors may have sustained by reason of any infringement of said claims of said Letters Patent by the defendants.

And it is hereby referred to a Master of this Court (who is hereby appointed for the special reason to take and state an account of such gains, profits and advantages, and to assess such damages, and to report to the Court thereon with all convenient speed. And the defendants and each of them are hereby directed and required to attend before said Master from time to time as required, and to produce before him such books, papers and documents as relate to

the matters at issue, and to submit to such oral examination as the Master may require.

7. That a perpetual injunction issue out of and under the seal of this Court enjoining and restraining the defendants and each of them, and their and each of their officers, directors, associates, attorneys, solicitors, clerks, servants, agents, employees and workmen from directly or indirectly making, or causing to be made, using, or causing to be used, or offering or advertising for sale, or causing to be offered or advertised for sale, or importing or causing to be imported, or selling or causing to be sold in any manner, or disposing of in any way, within the United States, any road-engines, vehicles, automobiles, devices or apparatus containing or embodying or employing any of the inventions described in said Letters Patent and claimed in said first, second and fifth claims thereof, or substantial or material parts thereof, or from infringing said claims of said Letters Patent in any way whatsoever.

8. That the complainants do recover of the defendants their costs and disbursements in this suit, to be taxed by the Clerk of this Court, and that the question of increase of damages and all further questions be reserved until the coming in of the Master's report.

Jersey May Hold Up Tourists as Reprisal Act

MEASURES of reprisal which have been adopted by several States adjoining New Jersey against that State on account of the Jersey statute that makes it obligatory for touring automobilists who venture wheel upon the sacred soil of the Garden State to take out a license or suffer the various penalties provided by law for just such cases, have aroused Jersey automobilists to a pitch they have never reached before.

The feeling against the State of New Jersey on account of the stringent road law has taken concrete shape in Pennsylvania and New York. In Pennsylvania, particularly in the city of Philadelphia, the status of the visiting Jersey motorist is unpleasant. No sooner does a touring Jerseyite enter Philadelphia than he is arrested if he has no Pennsylvania permit. What makes the Jersey citizens froth at the mouth about this procedure is the fact that any car bearing a New York license is not disturbed in any way in Pennsylvania.

Only recently a fine example of how this practice works was afforded by a case in Philadelphia. A New York tourist who had been spending some time in Jersey and who was equipped with a State license of that State crossed the ferry and started up Market street.

He managed to get three blocks before the watchful officers spied the triangular license tag and descended upon him.

Up to the City Hall he was taken by the police and a fine as well as payment of the Pennsylvania license fee seemed certain. The prisoner protested that he was a New Yorker and had a New York license. The police asked to be "sighted," and when the prisoner produced the New York permit he was instructed to remove the Jersey license and replace it with that of New York. This was done and the prisoner and car were released with the injunction to go as far as they liked.

It is such instances as the one recounted that get on the nerves of Jerseyites.

Last winter an amendment to the automobile law was passed making it possible for non-resident tourists to secure touring licenses in New Jersey for a period of eight days during one year. These permits may be withheld in the discretion of the commissioner, and such action is being contemplated against automobilists of Pennsylvania and other States in which Jersey owners come afoul of the law. The action with regard to Jersey on the part of Pennsylvania is similar to the recent attitude taken against Maryland.

Twenty-Four Start in Wisconsin A. A. Run

MILWAUKEE, WIS., July 18—Twenty-four cars were sent on their way at 7 o'clock this morning for the first annual reliability competition of the Wisconsin State Automobile Association for the $800 Milwaukee *Sentinel* trophy. In addition, there were five official cars, the 1911 Peerless acting as pacemaker.

The contestants are:

No. Car	Entrant	Driver
1—Rambler	Rambler Garage Co.	Edward Collier
2—Rambler	Rambler Garage Co.	Art Gardiner
3—Badger	Badger Motor Car Co.	E. W. Arbogast
4—Badger	Badger Motor Car Co.	H. A. Arbogast
5—Mitchell	Mitchell Auto Co.	F. P. Wilkins
6—Cadillac	Jonas Automobile Co.	Aug. A. Jonas
7—Jackson	W. L. McEldowney	W. L. McEldowney
8—Buick	Buick Motor Co.	Wm. Fisher
9—Buick	Buick Motor Co.	
10—Kissel	The Kissel Kar Co.	N. C. Rice
11—Kissel	The Kissel Kar Co.	W. R. Rice
12—Kissel	The Kissel Kar Co.	Arthur Ove
14—Pierce-Racine	Morrison Motor Car Co.	Lewis Strang
15—Johnson	Johnson Service Co.	J. W. Eviston
16—Ohio	Case Plow Works	Ross Neuwood
17—Pope-Hartford	Emil Estberg	F. L. Buckbear
18—Reo	Curtis Auto Co.	E. H. Thomas
19—Corbin	Curtis Auto Co.	Gordon Bird
20—Ford	Hickman-Lanson-Diener Co.	W. H. Diener
21—Franklin	Franklin Auto & Supply Co.	M. E. Springer
22—Overland	Bates-Odenbrett Auto Co.	John Heber
23—Staver	Stephenson Motor Car Co.	Chester Cheney
24—Petrel	Petrel Motor Car Co.	G. D. Waite
26—Marion	Geo. Browne	Geo. Browne

The route of the tour covers a distance of 808 miles, including practically every section of the State of Wisconsin within a sweeping circular course. The night stops will be at Madison, the State capital; La Crosse, Eau Claire, Merrill and Appleton. David Beecroft, of Chicago, is chairman of the Technical Committee.

Secretary Elliott Makes Denial

"Have never, in any position which I have held, criticised my superior officer."

State Troops to Guard Elgin Road Race Course

CHICAGO, July 19—The Chicago Motor Club and Elgin Automobile Road Race Association, which are promoting the road races at Elgin, Illinois, on Friday and Saturday, August 26 and 27, to-day secured military protection when the services of the Fifth Regiment of the Illinois National Guard were promised by Colonel Frank S. Wood, the officer in command. The Fifth will furnish between 200 and 300 men, plenty to guard a nine-mile course. The contractors are busy on the course at the present time and next week the trophy question will be settled.

The Chicago Motor Club also announced to-day that the annual Hill Climb at Algonquin, will take place August 11 instead of August 4 as first intended. The club has been obliged to give a $20,000 bond to protect Dundee County, in which Perry Hill is located. Entry blanks are now out.

Franklin Branch Managers Meet

SYRACUSE, N. Y., July 18—The branch managers' convention of the Franklin Automobile Company was held this week, beginning Wednesday and closing to-day. There are 13 Franklin branches—the concern finds 13 a lucky number—and Boston and 'Frisco and much intermediate territory were represented. J. E. Walker presided and S. E. Ackeman was secretary.

The district managers present were: J. F. McLein, San Francisco; S. N. Lee, Albany; F. H. Sanders, Rochester; George E. Messer, Syracuse; H. T. Boulden, Cincinnati; C. H. Rockwell, Cleveland; F. L. Thomas, Chicago; George Ostendorf, Buffalo; E. W. Orr, Buffalo; A. B. Henley, Boston; W. F. Reynolds, Pittsburgh; W. S. Jewell, New York, and W. E. Brearley, St. Louis. The salesmen present included R. H. Laporte, Glenn A. Tisdale, L. E. Hoffman, J. L. Wetherby, D. F. Garber, G. S. Ruhl and F. A. Babcock.

Matheson Creditors Believe in the Future of the Company

CREDITORS of the Matheson Motor Car Company, of Wilkes-Barre, Pa., which went into the hands of a receiver July 7, met at the Hotel Breslin Tuesday at the suggestion of the receiver to formulate some plan by which the life of the company might be insured.

The meeting was attended by 52 creditors, representing a majority of the claims both in number and amount. E. C. Fretz, of the Light Manufacturing & Foundry Company, of Pottstown, presided.

The purpose of the meeting was outlined by several of the speakers. They said that it was their wish to arrive at some plan by which the receivers might be discharged as soon as possible, both for the sake of the creditors and for the company itself. The fact was emphasized that the assets of the company showed $262,000 more than the liabilities, and that a little time would develop whether or not the company would be able to rescue itself.

C. W. Matheson was called upon to outline present conditions and said that at the time the receiver was appointed the company had valid contracts upon its books for the sale of 228 cars of a wholesale value of over $600,000.

That sum would be sufficient to wipe out the claims, according to many of those who attended the meeting.

The underlying reason for the difficulty in which the Matheson company finds itself is the weather that obtained throughout the country last Spring, particularly in the Middle West. There were two months of unseasonably cold weather, followed by six weeks of rain, and the result was that automobile dealers who contracted for cars from the factory and made the usual deposits upon them were unable to make deliveries to their customers because of the bad weather. Few purchasers of cars care to give them their initial try-out in a driving rainstorm or at a time when ear-muffs and bearskin gloves are necessary. As a consquence, even where dealers had closed with purchasers, there was much delay in placing the cars.

The four chief creditors of the Matheson Motor Car Company are the Light Manufacturing & Foundry Company, the Bosch Magneto Company, the Diamond Rubber Company and the Reading Metal Body Company.

In naming a committee of creditors to investigate conditions and to act in harmony with the management of the company and the receivers, Chairman Fretz appointed himself, representing the Light Manufacturing & Foundry Company; G. J. Bates, of the Diamond Rubber Company, and J. C. Reiber, of the Reading Metal Body Company. The Bosch Magneto Company, although one of the heaviest creditors, did not seek a place upon the committee.

The meeting adopted resolutions of confidence in the company and the car, and endorsing any action that the committee may take.

The resolutions pledge co-operation with others in interest to devise ways and means for the speedy discharge of the receivers. The action of the creditors was unanimous in all material points covered by the meeting.

It was pointed out that a receiver is simply an officer of the Court, that all receiverships are costly, and that in case of the creditors securing the discharge of the receivers the business of the company could be vastly facilitated.

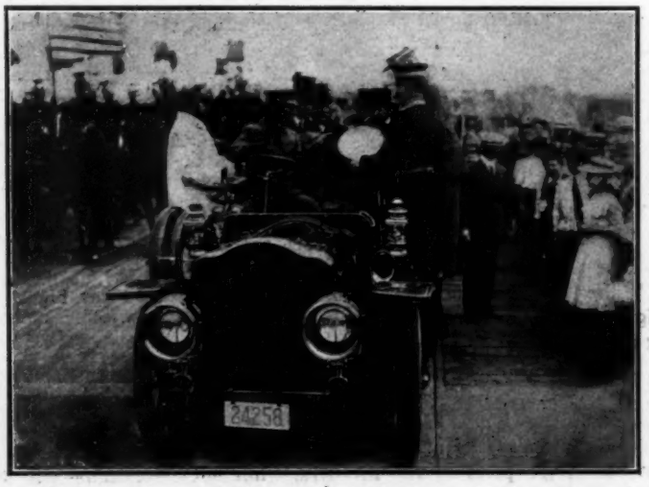
A reorganization of the corporation upon a larger basis of capital was clearly outlined in the proceedings.

The Matheson Automobile Company, the selling company for the product of the factory, remains intact. Definite action on the part of the committee will probably take place in the immediate future and something in the nature of results is likely to develop in a month.

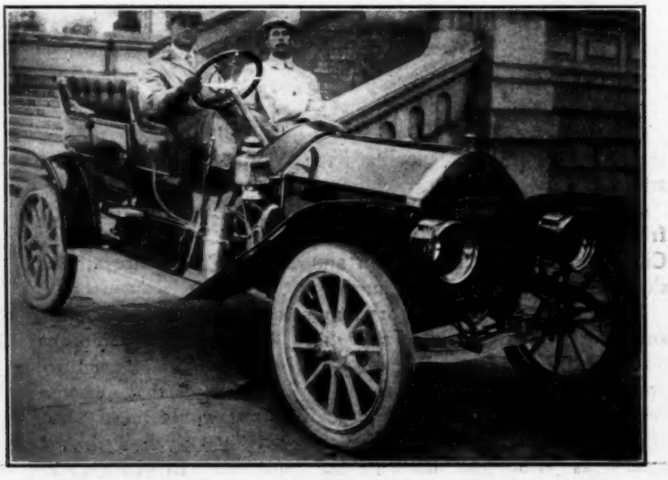
There was a distinct feeling of confidence apparent at the meeting.

1911 Parry Models Increased in Number

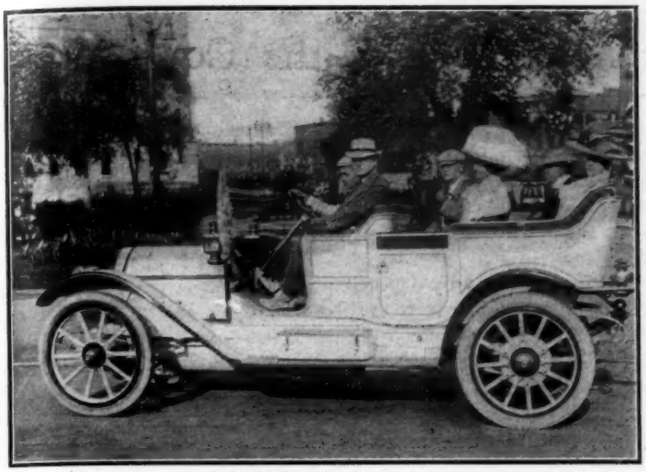
With the broadening of the facilities at the Parry plant in Indianapolis the Parry Auto Company is bringing out eight 1911 models ranging in price as follows: $1,000 for Model 25; $1,300 for Model 43; $1,350 for Model 42; $1,500 for Models 37 and 39; $1,600 for Model 44, and $1,850 for Models 41 and 46. A certain amount of curiosity is evinced on the part of the auto-purchasing public, and, remarkable as it may seem, the old idea that the automobile is to be lowered in price marvelously in the course of time is vanishing. This range of prices for Parry automobiles, for instance, shows a certain stability. While the company offers a wider range of choices and a better value of equipment, it is holding its market tenaciously. Take the tire problem, for instance; the lowest-priced car, which is the roadster Model 25, has relatively large tires, considering the weight, but jumping to Model 39, which is the Combination Roadster, the tires are 34 x 3½, which, by the way, was originally stated in the advertised announcement of July 7 in THE AUTOMOBILE to be 36 x 3½. Obviously, the 34 x 3½ is a better proportion for this model. The Model 46, however, is fitted with 36 x 3½ tires and demountable rims.



President Taft used the White as an official car at the Fourth of July celebration in Boston



Up-to-date Inter-State in complete trim for touring ready for the ambitious owner to appropriate to his own use



Grand Exalted Ruler Sammis in the purple-and-white Chalmers "40" at the Elks Convention in Detroit

Arch Hoxsey, the daring aviator, who occasionally does a little land traveling in his Cartercar

Chalmers "40" the Official Car at Elks Convention

Throughout the week of the national convention of the B. P. O. E. in Detroit—July 11th to 17th—Grand Exalted Ruler J. U. Sammis, of Iowa, attended to his official business in a 1911 Chalmers "Forty" touring car. This car was specially finished in white with purple striping and royal purple upholstering for the big Mogul of all the Elks. The driver wore a uniform of white with purple trimming.

Daring Aviator an Accomplished Autoist

Arch Hoxsey, who is said to be the most daring operator of a Wright aeroplane, barring the Wright Brothers themselves, is also an enthusiastic automobilist. Last week his flights at Detroit were the most sensational ever witnessed in Michigan. While in Detroit Mr. Hoxsey drove a Cartercar, and is shown at the steering wheel with George Reason, branch manager for Cartercar, beside him.

Aviation News of the Week

OFFICIAL announcement of the terms and conditions of the aeroplane race from New York to St. Louis or from St. Louis to New York has been made. The New York *World* and the St. Louis *Post-Dispatch* offer a purse of $30,000 to the aviator who first accomplishes the feat under the rules, which are as follows:

The start shall be made some time between August 15, 1910, and January 1, 1911; the time limit is 100 consecutive hours and the entrant must use the same aeroplane throughout the trip. The only condition made by the donors of the rich prize is that three days' notice shall be given to either of the newspapers of intention to start.

The first announcement of the intention of the Pulitzer papers to hang up a big prize for a cross-country flight was made by Mayor William J. Gaynor, of New York, on May 31, this year, when he acted as spokesman for the donors at a banquet tendered to Glenn H. Curtiss after the completion of his flight from Albany to New York city.

Interest in the project was intense and immediate, not only on the part of the aviators themselves, but also in the public mind, both here and abroad. Glenn H. Curtiss is preparing to make the attempt as early as possible; the Wrights are completing an advanced type of racing machine; Clifford B. Harmon, the New York amateur; Charles K. Hamilton, who made the round trip from New York to Philadelphia recently; J. C. Mars, of Kansas City; Hubert Latham, Paulhan and Graham White are all considered more than probable starters.

Under the rules the aviators may select any routes they please and may stop as often as they like. It has been figured that traveling five hours during each of the four days allowed will prove sufficient sailing time to cover the 900 miles that intervene between the metropolis and St. Louis. That would mean a rate of at least 45 miles an hour, which has frequently been demonstrated as within the limits of the aeroplane. In order to remove the chance for technical disqualification that might exist if any binding system of elaborate rules were enforced, it is provided that the contestant himself shall be the judge of the start. If he finds after traveling any distance that his machine is defective, he may declare it "no start" as far as he is concerned, and may make another attempt.

British aviators and public have had their attention fixed for the past week on the Bournemouth meet, which has resulted in a series of distressing accidents, including the one which cost the Hon. Charles Stuart Rolls his life. One of the most sensational performances of the week was that of Robert Loraine, actor, who essayed to make the circle around the Needles, spindling rocks in the Solent. Almost from the moment of the start Loraine and his machine were enclosed in storm clouds, and before the actor had progressed to the outer mark he lost his way completely. With no idea of direction and unable to catch a glimpse of sea or land through the driving rain, the Thespian simply kept flying until his machine emerged from the storm and he was able to make a landing at Alum Bay, on the Isle of Wight.

Alan Boyle, son of the Earl of Glasgow, suffered a nasty fall with his monoplane, and at latest reports is hovering between life and death.

Count De Lesseps, who was the star performer at the aviation meet that closed Saturday at Toronto, made a high flight in his Blériot machine, scaling the air over 3,000 feet. On account of possible complications with the courts on account of the Wright injunction, the Frenchman will not perform in the United States for the present or immediate future.

Walter R. Brookins, who holds the world's record for high flight, gave an exhibition at Detroit Saturday in a gale that blew 25 miles an hour.

Plans for the International Aviation Tournament to be held at Garden City, L. I., in October are being made along unique and interesting lines. One of the main features of the meeting will be a sham battle in the air, in which European aviators will be cast in the parts of the invaders, while the Americans will take up the roles of defenders. A committee of aviators and military men are preparing the details of the proposed battle.

Matters of Interest to Boston Autoists

BOSTON, July 18—Motorists, who a few days ago believed that it would be an easy matter to convince the highway commission that the rule barring motor cars from the park system is a bad one, are not so sanguine that they can do so. The matter has taken on something of a political aspect, and the men who have watched the trend of affairs would not be surprised now if the commission approved the ruling, which would put it squarely up to Mayor Fitzgerald, of Boston. In other words, the highway commission may object to being used for political purposes.

As a result of what has developed there will be a lot of owners and dealers on hand when the hearing is held July 27 to protest against closing the roadways.

Secretary James Fortesque has sent out letters to the members of the Massachusetts State A. A.; the officers of the Bay State A. A. have taken up the matter also; the Boston Automobile Dealers' Association is to have a meeting to take action on the matter; the Automobile Legal Association officials have asked William A. Thibodeau to represent it at the hearing; and the National Automobile Association will be represented by Francis Hurtubis, Jr.

A number of individual motorists have already written letters of protest to the highway commission. It promises to be a lively hearing for the closing of the roads in the parks would mean sending motorists out of their way over rough and cobblestone roads coming in and going out of town every day.

An agency has been opened in Boston for the McIntyre truck. E. P. Blake, New England distributor of the Jackson and Fuller cars, has taken it on.

R. R. Ross has taken over the management of the Boston branch of the Fiat, while Simeon R. Baker, whom he succeeded, has moved down the street to the New England Motor Company, where he is now assistant sales manager, handling the Parry and Rainier cars.

W. S. Marsh, Boston agent for the M M motor cycles, has branched out, having taken on the Paige-Detroit for Boston and vicinity.

For the first time in some years motorists going to the south shore, found yesterday that they could go through Hingham, Mass., without having policemen jump out and get their numbers for prosecution, the traps there having been abolished. This was brought about by the newly formed Hingham Motor Club. This town was getting unenviable notoriety for arrests of motorists, and many owners avoided the place all Summer, making wide detours to cut it out.

So the club's executive officials took the matter up with Chief of Police W. I. James. After several conferences he stated that he would abolish the traps if the motorists will keep down to 15 miles in the congested part of the town, slow down and blow a horn at intersecting streets and use judgment in driving through the place.

However, he reserves the right to establish the traps again if necessary, so it is up to the motorists now. Members of the A. L. A., the Bay State A. A., and other organizations will be notified of the conditions and asked to co-operate to keep the traps eliminated.

United States Motor Co. Holds Annual Convention

Officers and representatives of the United States Motor Company and of its affiliated companies held their annual convention at Cedar Point, Ohio., July 11, 12 and 13.

The meeting afforded the first opportunity to bring together the combined sales forces of the Maxwell-Briscoe Motor Company and the Columbia Motor Car Company, although there were representatives from the other United States Motor Company plants and they manifested great interest in the methods and deliberations of the Maxwell and Columbia forces.

During the convention the many phases of activity in large selling organizations were discussed and after due consideration the policies and aims of the United States Motor Company were given emphatic expression. One of the matters which received unusual attention was the sales system and the supervisory organization by which the United States Motor Company will cover the entire country.

Among those present were: Benjamin Briscoe, president of the United States Motor Company; J. D. Maxwell, president of the Maxwell-Briscoe Motor Company; F. D. Dorman, vice-president of the Maxwell-Briscoe Motor Company; H. W. Nuckols, vice-president of the Columbia Motor Car Company; F. E. Dayton, sales manager of the Columbia Motor Car Company; Frank Briscoe, president of the Brush Runabout Company; Morris Grabowsky, general manager, Alden-Sampson Manufacturing Company; F. Harris, sales manager, Brush Runabout Company; J. I. Jameson, sales manager, Stoddard-Dayton Company; Charles E. Stone, commercial vehicle expert, Alden-Sampson Manufacturing Company. There were also the district managers, the branch house managers, and a number of dealers, as well as the advertising men of the United States Motor Company, Maxwell, Stoddard-Dayton, Brush and Columbia.

Officers, department heads and district managers of the United States Motor Company in conference with the officers, branch managers, sales and advertising managers of its affiliated companies, at Cedar Point, Ohio, July 11, 12 and 13

Hoosier Motordom in the Week's News

INDIANAPOLIS, IND., July 18—The next event at the Motor Speedway will be held September 3 and 5, instead of having a three-day meet, as at first planned. Approximately $10,000 in cash prizes will be offered, besides cups and medals, and an effort will be made to attract foreign drivers.

The principal event will be a 200-mile race on September 3. This will be open to all cars under 600 cubic inches piston displacement. First prize will be $1,000, second prize $500 and third prize $300. Other events will be the Remy Grand Brassard and Prest-O-Lite trophy races. E. A. Moross, director of contests, will go to Europe to secure the entries of several famous foreign cars and drivers for the meet.

A company which will manufacture gasoline trucks and other commercial vehicles is being organized in this city and will be incorporated with an authorized capitalization of $1,000,000. The concern will be known as the Great American Automobile, Auto Truck & Aeroplane Company. Temporary officers are: Samuel Quinn, Jr., president; John Feigen, vice-president, and A. J. Bigley, of St. Louis, Mo., secretary and treasurer.

Owing to a shortage of funds, the Indianapolis post office has been obliged to discontinue the 4 p. m. mail delivery in the business district. It is to be resumed immediately, however, and the four automobiles used for collecting mail will be utilized for delivering the mail in question in the business district, thus saving the salaries of several carriers.

Business men have organized the Greenfield Auto Traction Company, at Greenfield, and it has been incorporated with an authorized capitalization of $10,000.

The Fuller and Cutting agencies have been taken by the newly organized Auto Sales Company, which has taken temporary quarters in the Indiana Pythian Building. Douglas Case is president, M. G. Beckner vice-president, and Cass Connaway is secretary and treasurer.

Two Marmon and two Cole cars have been entered in the road race to be conducted by the Chicago Motor Club, August 26 and 27. It is expected other local cars will be entered later.

A. C. Newby, secretary and treasurer of the National Motor Vehicle Company, has gone to Europe for a six weeks' pleasure trip. He was accompanied by Mrs. Newby.

Issues Jersey Tags in Delaware

WILMINGTON, DEL., July 11—Charles G. Guyer, of 826 Market street, Wilmington, has been commissioned deputy motor vehicle commissioner for the State of New Jersey, in Delaware, with authority to receive license money and issue certificates and tags entitling the holders to use New Jersey roads. Mr. Guyer, who is secretary of the Delaware Automobile Association, was appointed by J. B. R. Smith, of Trenton, the motor vehicle commissioner for New Jersey.

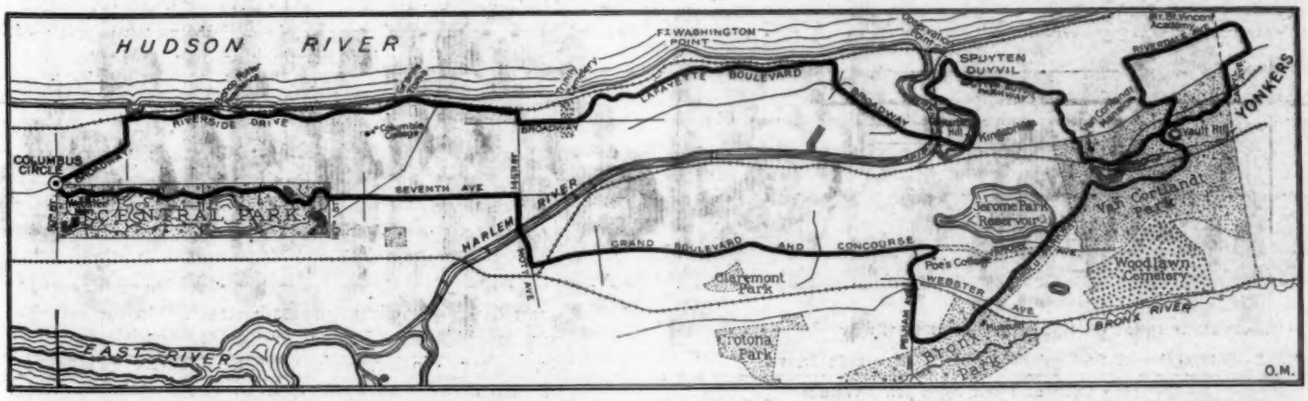
The establishment here of a New Jersey automobile license bureau is a great accommodation, not only to local machine owners and drivers, but also to those from other States passing through New Jersey from the South, as it enables them to pay the license and get the necessary tag and certificate here before crossing the Delaware River. If they were not afforded this accommodation they would have to hunt up a license bureau in Jersey or submit to arrest for failure to do so. In view of the fact that New Jersey requires a State license for every machine going there, this is a matter of interest to all non-residents living south of that State.

Near-by Motor Wanderings—Short in Length, Long in Interest

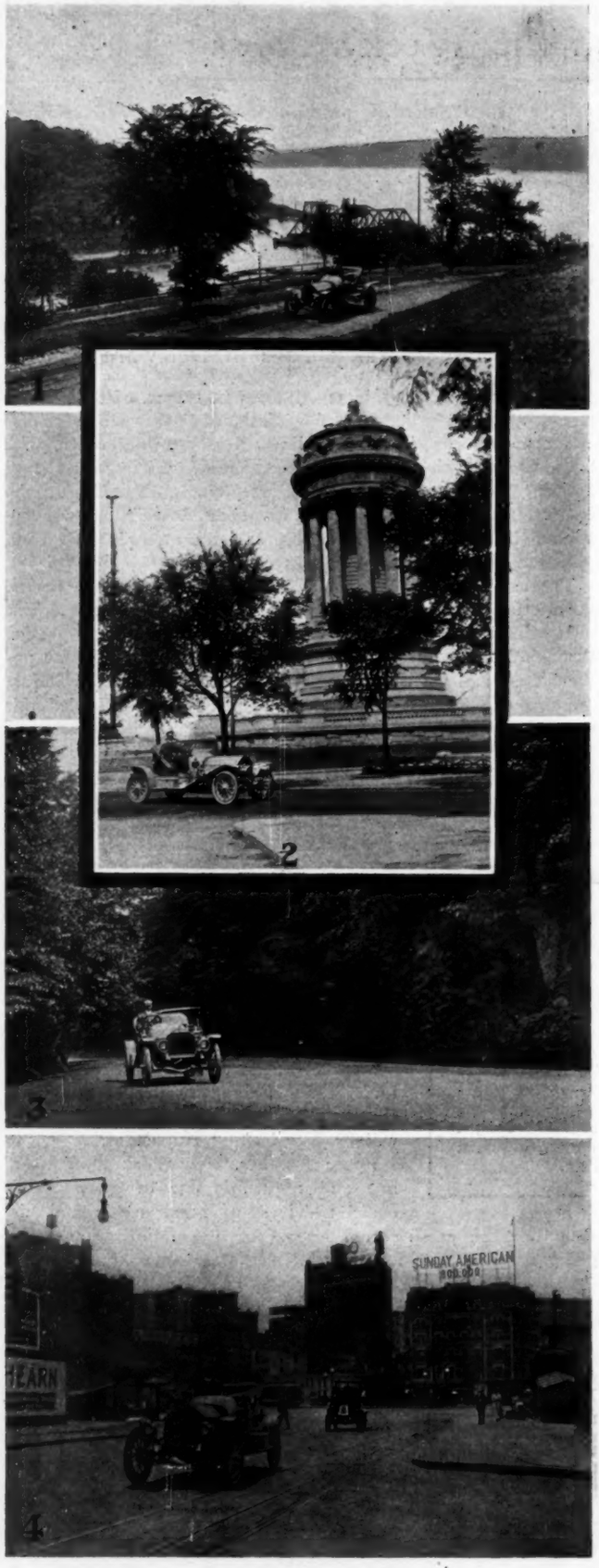
An illuminating example of the Baedeker feature of the new Metropolitan Automobile Guide, with special reference to the autoist to whom time is an object, but who is yet sufficiently awake to the interest and beauty of tours to points of historic value or scenic delight as to yearn for something different from the commonplace.

TO the New Yorker who knows not his New York, to the visiting motorist of an inquiring mind who would learn more of America's most important city and its environs, to the seeker after more than the mere delight of motoring on good roads—the new Metropolitan Automobile Guide will make especial appeal. Through the courtesy of its publishers, who are makers also of the Official Automobile Blue Book, we are enabled to present in full one of the many interesting routes comprised in its hundred round-trips from New York. The trip given below covers 30 miles of Metropolitan Wonderland, and is embellished with photographs of some picturesque spots en route, and a map showing the lay of the land. We make no doubt that many of our readers will avail themselves of the opportunity for trying out in advance the merits of this new Automobile Baedeker, which will be issued about August 10.

Route No. 211, New York to Yonkers line and return, is one of New York's choicest drives—of great scenic and historic interest, passing many spots of Revolutionary memory, going via Riverside Drive and Riverdale avenue, returning via



Map of a short but interesting near-by route which the motorist whom business bars from long tours may follow with advantage



1—Observation Point on Spuyten Duyvil Parkway

2—Soldiers' and Sailors' Monument, Riverside Drive

3—Entering Central Park from 7th Avenue

4—Starting out—Columbus monument at the Circle

Van Cortlandt Park, Mosholu Parkway and the Grand Boulevard. Fine macadam throughout.

MILEAGES

Total Intermediate

0.0 0.0 Columbus Circle, Broadway and Fifty-ninth street north on Broadway with trolley; under elevated at Lincoln Square.

0.7 0.7 Keep right of subway entrance and turn left on Seventy-second street.

1.0 0.3 End of street, turn right on Riverside Drive. Pass Schwab residence on right (1.1), Soldiers' and Sailors' Monument on left (1.8) and Bishop Potter's residence on right (corner Eighty-ninth street). Site of Strikers Bay Mansion between Ninety-sixth and Ninety-seventh streets, where Morris in 1837 was inspired to write "Woodman, Spare That Tree." The Carrigan House, with columns, corner 114th street, on site of original Nicholas de Peyster House. On the river bank opposite is the Columbia Boat House—over to the right are seen the buildings of Columbia College.

3.5 2.5 Curve right and left around Grant's Tomb, and cross long viaduct. Grant's Tomb, 1892-7—cost $600,000 by private subscription. Designed by J. H. Duncan; interior decorations by J. Massey Rhind. Trees beyond tomb planted by Li Hung Chang. See the grave of An Amiable Child (1792-97) nearby. The Claremont, now a fashionable restaurant, was built about 1790.

4.1 0.6 Turn right on 135th street one block.

4.2 0.1 Turn left into Broadway. Pass under footway connecting Trinity Cemeteries. Note the tablet on left commemorating the assault of Fort Washington. Within are tombs of J. J. Astor, Stephen Jumel, General Dix and others. In 1807 155th street was made the northern limit of the city. The Audubon Home (Minniesland) lies near the river in Audubon Park. On the left at 156th street is the new home of the American Geographical Society—opposite on 156th street is the Hispanic Museum and the Numismatic Museum.

5.3 1.1 Subway station, bear left into Lafayette Boulevard. Pass the Deaf and Dumb Asylum (on right, 5.9 m.). At 6.7 m. is the entrance (on left) of Fort Washington Park. An old redoubt (1776) lies beyond the deep railroad cut of 1847, the first railroad to enter the city. A hole in a flat rock marks the site of a telegraph mast used to carry wires across the river before the day of the submarine cable. Fort Washington Point (old Jeffreys Hook) is where Washington made crossings of the river, and where barges were sunk to keep back the British fleet (1776). Just beyond the park entrance, high up on a rock, is the castle-like residence of an Italian contractor. A flagpole marking the remains of Old Ft. Washington is visible to right, the highest point of land on Manhattan. At 7.5 a view to the left of Old Fort Tryon, and just beyond a wide sweep of the Hudson.

8.1 2.8 Five-corners, yellow church on left; turn left into Broadway. Cross long iron bridge over ship canal (9.2). At the five-corners is the site of the old Black Horse Tavern—pass on the left at the corner of Hawthorne street the Old Dyckman House of 1787, and ¼ m. beyond the 12 m. stone set into the wall of the Isham estate. The marble arch (8.9 m.) is the entrance to the Drake property. Beyond the ship canal to the left is Marble Hill, where earthworks were thrown up to protect Kings Bridge (1776).

9.5 1.4 Cross small iron bridge over Spuyten Duyvil Creek and immediately turn left, on 230th street. On the left (9.6 m.) is old Kings Bridge, first built 1693, destroyed in 1776 after Washington's retreat. Queens Bridge east of Broadway was built 1759 to avoid tolls on Kings Bridge and was broken down at the same time.

9.8 0.3 End of road, turn square left along creek. Go over railroad bridge (10.3 and 10.4). Caution for sharp right turn (10.5 m.). Note the old houses just before the railroad.

10.5 0.7 Fork, bear right up grade, curving right and left through crossroad.

10.8 0.3 Reverse fork, turn sharp right up grade on Parkway. At this point an unequaled view of the Hudson north and south.

11.0 0.2 Fork, bear right and next left on Spuyten Duyvil Parkway. Pass the Seton Hospital (on left 11.4 m.).

11.8 0.8 Fork, bear left, crossing Riverdale avenue (11.9 m.). Descend narrow winding road to the valley. On the right are the terminal yards of the subway.

12.7 0.9 End of road; turn left under elevated, and immediately right into Van Cortlandt Park. On the left is the old Van Cortlandt Mansion (1749) fronting the "Dutch Garden" with moat. Visit the museum in care of the Colonial Dames, guide book secured from custodian. Near the mansion is the "Rhinelander Sugar House Window" from the building at Rose and Duane streets, and the statue of Gen. Josiah Porter. To the north is the old parade or camping ground, now used for polo.

12.9 0.2 Left-hand road in front of underpass, turn square left.

13.0 0.1 Fork just beyond small wooden bridge, bear right. Pass the old Berrian graveyard (on right), the lake lying just beyond. Caution for sharp right turn under railroad (13.5). Vault Hill, with the old Van Cortlandt burial vault, lies to the left. Here were hidden the records of New York City in 1776.

13.8 0.8 Fork, bear left on parkway.

14.1 0.3 Fork, bear right up grade over winding road.

14.09 0.8 Turn left on Caryl avenue, immediately over railroad bridge.

15.1 0.2 End of street, turn right on Broadway.

15.4 0.3 Real estate office on left, turn left into Valentine Lane.

15.7 0.3 Meet trolley, turn left on Riverdale avenue. Straight ahead on Valentine Lane would take us past the lifeless trunk of an old chestnut, said to have been used by Washington for reconnoitering. At the corner of Hawthorne avenue is the old Lawrence House, once occupied by Washington's guide. On Riverdale avenue we pass the Clara Morris home (15.9), and just beyond the extensive Mt. St. Vincent Academy, in the grounds of which may be seen Font Hill, the former home of Actor Forrest.

16.7 1.0 Turn left on 253d street and descend winding grade.

17.2 0.5 End of road; turn left on Old Post Road. To the south on the Old Post Road are several houses of the eighteenth century, the Van Cortlandt Millers House and the Halley House, partly of stone, being the most interesting.

17.4 0.2 Turn left into Broadway.

17.5 0.1 Turn sharp right on Mosholu Parkway, passing under railroad (17.7).

17.8 0.3 Three-corners; turn right.

17.9 0.1 Fork; bear left. Cross railroad at grade (18.2).

18.4 0.5 Fork; golf links on right. Bear right along lake.

19.2 0.8 Turn sharp left around refreshment station up grade. Cross Jerome avenue (20.0). Bridge over Webster avenue (20.7) and railroad bridge (20.8), immediately curving right. In front is the museum at the entrance of Bronx Park, and we follow the park driveway for ¾ m.

20.9 1.7 Three-corners; curve left, then keep right.

21.3 0.4 Three-corners; curve left, avoiding right fork (21.5).

21.6 0.3 Turn right on Pelham avenue. Pass on the right the Stenton residence, with secret rooms, scene of the 1906 murder. In front stands the old willow; across the street is the Powell farmhouse, the oldest in Fordham. Passing under the Third avenue elevated, just beyond is Nolan's Hotel, where Washington once stopped.

5—Rounding a curve on Boulevard Lafayette

6—"The Concourse," New York's newest driveway

7—"Washington's Chestnut," on Valentine Avenue, Yonkers

8—Poe's cottage opposite Poe's Park on Kingsbridge road

22.4 0.8 Three-corners; bear right on Kingsbridge Road. On the right (22.5) is Poe's cottage, where he lived (1846-9) and wrote many poems, and where his wife, Virginia, died. A monument across the street in Poe's Park indicates the original location of the cottage.

22.7 0.3 Four-corners; turn sharp left into the "Concourse" wide boulevard.

25.8 3.1 Sigel Monument in fork; keep left on Concourse across 161st street (26.2 m.). Bear slightly right into Mott avenue.

26.4 0.6 Four-corners top of grade, subway station ahead on right; turn square across long iron bridge over Harlem River, curving slightly right beyond into 145th street.

27.0 0.6 Turn square left into Seventh avenue; straight ahead across St. Nicholas avenue and 116th street (28.5 m.).

28.7 1.7 Central Park at 110th street. Enter park, curving immediately right and shortly left. Caution for sharp right curve (29.0 m.).

29.3 0.6 Fork; just beyond stone bridge, bear right past Croton Reservoir (on left).

30.4 1.1 Fork; keep left on main driveway.

31.1 0.7 Webster Monument at fork of three roads; curve right.

31.6 0.5 Small statue in fork; bear right out of park into

31.7 0.1 Columbus Circle, 59th street and Central Park West.

The Enriching of Automobile Fuel

By JAMES S. MADISON

THE substances that have been most frequently used have been picric acid, containing 48 per cent. of oxygen, and ammonium nitrate, with 60 per cent. of oxygen. The use of these has not been attended with wholly satisfactory results, owing to their limited solubility in gasoline. The suggestion has been made that picric acid be dissolved in alcohol and then this solution added to the gasoline, but, unfortunately, gasoline and alcohol will not mix, the liquids separating into two layers, the gasoline being the upper one. There is another objection to the use of the two substances named above: they contain nitrogen, which, under the conditions existing in the cylinder at the instant of combustion, might form one of the oxides of nitrogen —substances that would tend to cause a rapid pitting and corrosion of the exhaust valves. Another method that has been employed to render the fuel more combustible depends for its effectiveness upon rendering the gasoline more volatile than it is under normal conditions. This is accomplished by adding to it some combustible substance of a considerably lower boiling point. The substances most commonly used are ligroin and petroleum ether. Sulphuric ether (ordinary ether) has also been used for the same purpose. The disadvantage of employing the latter is that it is only very slightly soluble in gasoline, and hence, if they be mixed, they soon separate into two layers.

The use of these and similar substances to increase the power has not been markedly successful. The result sought for may be easily attained by a slight modification of the method. Since the object desired is to introduce a larger proportion of oxygen into the mixture of gasoline vapor and air, this may be accomplished by using pure oxygen in its natural form—a gas—and introducing it directly into the cylinder along with the gasoline vapor.

So many improvements have been made in the manufacture of oxygen that it is now an article of commerce, and the compressed gas may be obtained in the market in steel cylinders of various sizes. A cylinder measuring 3 1-2 inches by 13 inches contains about 14 gallons of the gas.

The cylinder may be secured to the run-board, or other convenient place, and then connected with the air intake by means of ordinary rubber tubing. By opening the valve of the oxygen cylinder a fraction of a turn a small, steady stream of the oxygen gas will flow into the air-intake along with the air, thus increasing the proportion of oxygen in the mixture. This will cause the combustion in the cylinder of the engine to be more complete and more rapid, and the impulse delivered to the piston more powerful. The beginner should be content with mixing the oxygen with the air in very small quantities at first, or he may get explosions that are too powerful. He should not cut off the air supply entirely and attempt to substitute pure, undiluted oxygen.

This method will give better and more uniform results than the employment of such enrichers as mentioned above.

The cost of the oxygen is small. The cylinder is the only expensive part of the apparatus, but it is redeemed at its full value upon return to the dealer or factory.

Motor Notes from North Star State

MINNEAPOLIS, July 18—The annual tour of the Minnesota State A. A. will start from St. Paul Friday, and it is estimated that 60 or more cars will take part in the run to Sioux Falls, S. D., and return. The tour will finish at Minneapolis.

The Northland Motor Car Company has been reorganized. Details were completed last week, when George G. Ackley, a banker at Ramona, S. D., purchased an interest in the concern and will actively engage in the business. Mr. Ackley has been chosen vice-president of the company and will assume the general management during the coming week. Asa Paine still retains his interest as a co-partner, as does W. D. Rightmire, who will continue in the capacity of sales manager.

H. A. Peterson, of the Barclay Auto Company, spent the week in Detroit making arrangements for Chalmers and Hudson demonstrators for 1911. It is expected that the first of the new models of the former make will reach the Minneapolis distributors about the last of this week. The Hudson cars are expected a few days later.

John H. Shields, who is now in Los Angeles in the interests of the H. E. Wilcox Motor Car Company, will hereafter have a broader field to work, for his duties as sales manager will take him to practically every large city in the country. An active campaign for truck business has been inaugurated in California, and the concern at present has demonstrators at work in that state.

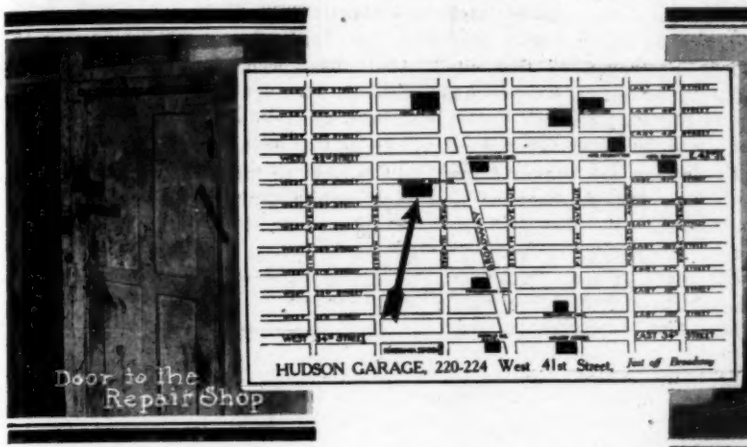
The Regal Motor Company, of Detroit, Mich., will soon establish a branch in Minneapolis. Articles of incorporation have been filed by the Minneapolis Regal Auto Company, with a capital of $25,000, the incorporators being C. W. Reynolds, H. S. Haynes, J. P. McGuire, E. C. Noyes, T. L. Myhra and C. H. Dickson.

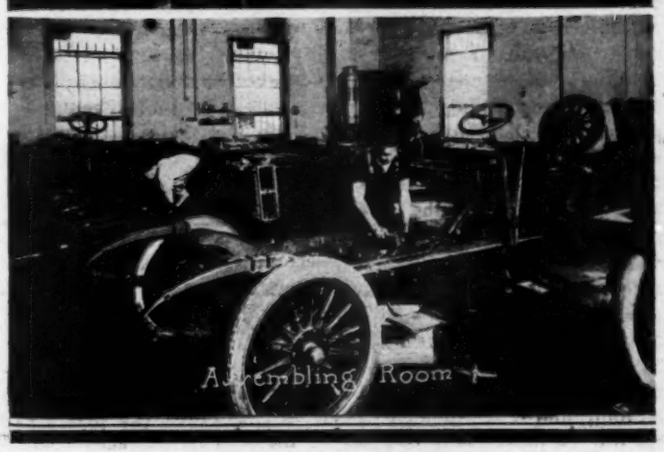
Messrs. Haynes, W. H. Grower and J. P. McGuire have also filed papers for another corporation, to be known as the Motor Equipment Company, with $50,000 capital.

Inter-State Used Reverse Gear to Win

At the hill climb, conducted July 10 on Mount Morris hill, near Denver, Col., the chief prize was won by an Inter-State "40," driven by F. A. King and R. Berry. The course is 1¼ miles long, and the ascent is slightly over 1,000 feet. The maximum grade is 35 per cent., and the course tortuous in the extreme. The winner covered this course in 5:35 3-5. Most of the way the Inter-State used its intermediate gear, but there was one place where it was necessary to use the reverse gear to back up one of the stiff-graded curves.

Among Modern Garages---The Hudson





RECOGNIZING the sweeping character of the demand for specific reforms in garage work, the better class of establishments of this character in New York City are organizing and equipping to meet the class of competition which has merit for its basis. The illustrations as here presented are of the Hudson Garage, located at 220-244 West Forty-first street, New York City. This establishment strikes one as having a peculiar merit in that there is a large, well-lighted floor area for the proper storage of cars, plenty of maneuvering room, so that they may be driven in or out without loss of time, or without endangering the mud-guards, and the arrangements provided for maintaining the automobiles in good working order have the virtue of being adequate for the purpose, and ingeniously installed.

One idea that could be very well copied by up-to-date garage owners is shown in the form of a diagram of the streets of New York. It indicates the locations of the principal hostelries and how to get from them to the Hudson Garage. There is another point that strikes a keen observer, which takes the form of a locked and barred entrance to the assembling room. One of the most annoying situations from an autoist's point of view is represented by having his car disassembled in a room which is accessible to every one who happens to come around for any purpose whatsoever. In the Hudson Garage the assembling room is a well-lighted and substantially equipped place, where cars are disassembled for purposes of repair, and after the repair parts are completed in the machine shop they are transferred to the repair shop, and are kept in an orderly array, with no chance of being lost, strayed or stolen, for the very good reason that the room is not accessible to outsiders, and the artisans who have access thereto are enabled to do so by properly approaching a locked and barred door.

A corner of the machine shop is shown. It is not large, but the equipment is designed to facilitate work.

In conclusion, the most striking feature of this garage will be given the barest mention. The repair shop, in proportion to the storage room and the number of cars handled, is actually diminutive, and yet it is large enough to do all the work that has to be done in the maintenance of the cars therein kept. There are probably two reasons for this, one of which is due to the fact that the better class of cars are handled, and the other reason is that the monthly rate for storage is regarded by the management as sufficient for its ends, and it prefers to acquire a reputation which will support it in the garage business rather than to operate a large repair shop as an annex, and by neglecting the cars, and in other ways, make work for the repair shop. This example is an excellent illustration of the fact that a large monthly repair bill is not a necessary adjunct to an automobile kept in a public garage.

In the Realm of the Makers

The Keystone Sheet Metal Company, of Ambridge, Pa., will start at once to manufacture mud guards and shields for automobiles at its plant down the Ohio River.

The Badger Tire Repair Company, of Milwaukee, Wis., has been incorporated with a capital stock of $5,000 by B. A. Massee, W. L. Baumbach and William A. McMillan.

The F. A. L. Motor Car Company, of Chicago, which sought a location at Kenosha, Wis., is now negotiating with the commercial organizations at Waukegan, Ill., for a site.

The Banker Wind Shield Company has just placed on the market its 1911 Model Wind Shield. The new model has an improved automatic ball ratchet hinge which allows the upper half of the shield to be placed at any desired angle.

The Holbrook-Armstrong Iron Company, of Racine, Wis., is completing the work of installing $40,000 worth of new machinery for the production of motors and car parts which will be used by the Racine-Sattley Company of Racine.

The McGraw Tire and Rubber Company has broken ground for a large addition to its present plant in East Palestine, O. It will add many new tire-building machines so that the output will be doubled, and it will employ 200 men.

Hopewell Brothers, makers of auto fabric specialties, Boston, have entered suit in the Federal Circuit Court against two alleged infringers of their patent on a certain type of tire case. Notice of the suit has been given to the members of the trade.

Three big companies allied with the automobile manufacturing industry have been secured for Pontiac. They are the Michigan Stamping Company, capital, $150,000; the Vulcan Gear Works, capital, $100,000, and the Pontiac Foundry Company, capital $80,000.

The C. A. Shaler Company, of Waupun, Wis., manufacturer of the Shaler vulcanizer, has awarded contracts for the construction of a new factory. The main building will be of reinforced concrete construction, 30 by 130 feet in ground dimensions, 90 feet to be two stories and the remainder one story high. The present plant will be used as a warehouse and storage.

The Badger Four-Wheel Drive Motor Company, of Clintonville, Wis., has procured subscriptions for $30,000 worth of stock, and it is now being permanently organized. Most of the stock was taken by business men at Clintonville. Both pleasure cars and commercial cars will be built, and it is intended to market the car for the 1911 season.

The Gaeth Automobile Company, capital $500,000, has been formed at Pittsburg by George S. Patterson, W. J. Harvey and George Protzman, of that city. It is backed by Cleveland capital and has secured a site in the Turtle Creek Valley, where a plant will be erected.

Omaha auto dealers are the principal promoters of the aviation meet to be held in Omaha July 23. The Midwest Aviation Meet Company has been incorporated with these officers: President, J. J. Deright; vice-president, R. R. Kimball; secretary and manager, Clarke Powell; treasurer, Gould Dietz.

The Ball Multi-Spark Plug Company has opened a factory at 917 Hennepin avenue, Minneapolis, for the manufacture of a newly patented spark plug. The company, which comes from Aberdeen, S. D., is headed by A. H. Pease and W. M. Pease, and has a capitalization of $100,000, of which $50,000 is paid up.

Several finished taxicab bodies and tops owned by the E. R. Thomas Motor Company were destroyed by a fire in the shipping room of the Buffalo plant recently. The flames caused a loss of about $10,000. The shipping room is situated a considerable distance from the main plant of the Thomas company, which was in no danger at any time.

The Omaha Motor Club, which was organized to promote a new mile auto racing track for Omaha, has incorporated with a capital stock of $10,000. The officers are: Ole Hibner, president; C. L. Gould, first vice-president; W. J. Kirkland, secretary; Eugene Silver, treasurer; directors, W. D. Hosford, W. L. Huffman, George F. Rheim, L. E. Doty and Otto P. Nestman.

Martin L. Pulcher has resigned his position as secretary and treasurer for the Oakland Motor Car Company at Pontiac, Mich. The resignation was to take effect July 1, but he will remain with the company until his successor is appointed from the general office of the General Motors Company in New York. He announces that he is leaving the Oakland company to turn his attention to the manufacture of commercial trucks.

Jesse Froelich, of the Benz Auto Import Company, has sailed for a business trip through Europe. At Mannheim, Germany, he will meet Prince Henry. Mr. Froelich will consult Fritz Erle, one of the Benz staff of mechanical engineers, who drove in the Savannah Grand Prize race, in reference to the Benz entries in the American contests next Fall, including the Vanderbilt Cup race, the Grand Prize race on the Motor Parkway, and the Fairmount Park race.

R. E. Glass, who early this year was made a director of the Michelin Tire Company, Milltown, N. J., has just been elected treasurer, succeeding E. Fontaine, who resigned recently.

The Millersburg (Ohio) Automobile Club has been formed, with W. W. Adams, president; B. S. Bontrager, secretary, and W. N. Crowe, W. S. Hanna and C. R. Carey as directors.

Contract to build the new home of the Automobile Club of Buffalo at Clarence Hollow, near that city, has been given to Metz Bros., Buffalo. It is expected that the clubhouse will be finished this Summer. It is to cost $50,000.

The Pittsburgh Automobile Dealers' Association is holding very successful monthly meetings the first Thursday of each month at its headquarters on Baum street, East End. The association held its regular annual outing Saturday, June 25.

The Superior Rubber and Manufacturing Company, of Akron, was incorporated with a capital stock of $10,000 to manufacture automobile tires. The incorporators were J. M. Hyatt, R. E. Nicol, W. J. Holtenstine, A. B. McAllister, and others.

The New Castle Automobile Club is offering prizes ranging from $50 to $5 for the percentage of improvements made this summer in the roads of each township in Lawrence County, 30 miles north of Pittsburg. Prizes will also be offered to farmers for the use of road drags.

Automobilists of Allegheny County are complaining severely about the careless manner in which the roads of this county are being oiled. They say that the Road Commissioner is not only allowing much oil to be wasted, but that by the present system of sprinkling the roads become like skating rinks, so that automobiles are constantly skidding.

That the R. M. Owen Company, of New York, which has the contract for the sale of the Reo pleasure cars, also will have charge of the selling end of the new truck business which the Reo company is about to enter, is the announcement made at the office of the Reo company following a visit from R. M. Owen. It is probable that the manufacture of trucks will be begun about September 1.

Directors of the Portland Automobile Club have decided to co-operate with the newly organized Vancouver, Wash., Automobile Club for the improvement of the highway between Vancouver and Kelso. Automobile owners are directly interested in the improvement of this road for the reason that it leads to Seattle and the Puget Sound country. The Vancouver club has only been organized a few weeks, with Thomas P. Clark, president; Will B. Dubois, secretary; C. N. Quanberg, vice-president; and Charles B. Sears, treasurer.

Agency and Garage News

At Norwalk, La., on July 4, the Westcott "40," owned by Dyson & Son, won two firsts in the hill climb from a standing start.

T. E. Adams has been elected president and treasurer of the Hol-Tan Company, handling the Lancia. The offices of the company are at 1741 Broadway, New York.

Jack L. Straub, secretary and treasurer of the J. S. Bretz Company, sailed for a five-weeks business trip to Europe, on the American-line steamer St. Louis.

At Dallas, Texas, on the Fourth of July, the Kissel "30" won the three-mile stock car event. The Kissel L. D. "10" baby tonneau finished ahead of five standard makes in this event.

Wallace and De Wild, of Newark, N. J., have taken the agency of the Cole "30" for Newark and Essex County for 1911, and will soon open a garage and salesroom in vicinity of Halsey street.

Louis C. Marburg, secretary and treasurer of Marburg Bros., Inc., sailed on the Celtic to attend a meeting of the Society of Mechanical Engineers at Birmingham. He is going from there to the Continent.

The Champion Company, formerly of 36 Whittier street, Boston, Mass., manufacturers of Champion spark plugs, have recently moved to Toledo, O. For the Eastern trade it will still maintain an office at 394 Atlantic avenue, Boston, Mass.

Weldon A. Fosdick, formerly salesmanager of the Moline Automobile Company of Texas, has associated himself with the Roberts Motor Car Company, at Dallas, Tex., as its salesmanager and secretary. This company is the State agent for the Thomas flyers.

At a recent test conducted at Columbia University, the half-inch size "Motorope" handled by B. M. Asch, 1777 Broadway, showed a breaking strength of 2910 pounds. The three-quarter inch size broke at 5019 pounds. It is made for an emergency aid for automobilists. It is light and of small bulk.

L. B. Williams, veteran English motorist, who drove in the preliminary trials of the Vanderbilt Cup Race in 1906 and who was also a contender in the Gordon Bennett road race in Ireland and the Grand Prix at Ardennes, France, has joined the selling force of the Westcott Motor Car Company, of Richmond, Ind., and will be located in New York city with the Dunlop-Taylor Motor Co., of 1876 Broadway.

The Saxon Lamp Company of New York City, manufacturers of headlights, tail lamps, generators, electric lamps, etc., has increased its capital stock to an authorized capital of $50,000 and elected the following officers: H. Saxon, Pres.; Smalley Daniels, Vice-Pres.; J. S. Taylor, Sec., and J. C. Nichols, Treas. The above constituting the Board of Directors. The company may move to Michigan or Indiana.

The Maytag automobile is now established in Spokane, and is in the hands of Ed. A. Leach and W. G. Carr.

The Brush Auto Company has opened a Portland agency at 608-610 Washington street. William Wilzinski is in charge.

The Goodrich Rubber Company has opened a branch in Spokane at 151 Post street under the management of W. J. Rooper.

Jones & Gardner, of Union City, Pa., are building a fine garage 38 by 75 feet, and will start an automobile repair shop at once.

Eddie Bald, Pittsburgh agent for the Everett car, was referee in the Fourth of July hill climbing contest at New Castle, Pa.

C. W. Cain has taken the agency for the Croxton-Keeton cars in Ohio, Indiana, Kentucky and West Virginia. He is now busy establishing local agencies.

The Palmer-Singer Distributing Company, handling the Palmer-Singer cars, have opened a new garage at Ninth street and Tacoma avenue, Tacoma, and are exhibiting a number of the 1911 models.

The Pittsburgh Automobile Company has secured the exclusive agency for Oakland automobiles for Pittsburgh and towns within a radius of 200 miles. The sales will be managed by Julian Howe, and the line will consist of touring cars, roadsters and runabouts.

G. C. Murray, representing the Northwest Buick Company in Spokane, recently established an agency in Sandpoint, Idaho. On account of the number of new cars recently purchased in that territory the roads are being improved in the vicinity of Lake Pend Oreille.

William A. Ryan, who for the past three years has represented the E. R. Thomas Motor Company as district sales manager in the middle West, with headquarters at Chicago, has resigned, and will enter the retail field at Des Moines, Iowa, beginning with the 1911 season, on July 1. He has incorporated a company to be known as the Ryan Motors Company, and has contracted for a large lot of Chalmers cars.

The Buick Motor Company this week moved into its new rooms at 509-513 Erie street, where it now has one of the best garages and repair departments in Toledo. Three floors and basement are used by the concern, a huge elevator serving to hoist cars to any part of the building. The first floor is devoted to the storing of cars, the second floor to the repair work. A complete parts department will be maintained, where every piece entering a Buick or Reliance truck can be secured.

Peter S. Steenstrup and wife recently made the trip by auto from Portland to Medford, Ore. Mr. Steenstrup reports a most enjoyable outing.

Harry Fosdick has resigned as vice-president and general manager of the Hol-Tan Company, of New York, American agent for the Lancia car.

H. N. Sankey, one of the best known automobilists in Pennsylvania, has been elected treasurer and general manager of the Kittanning Automobile Company at Kittanning, Pa.

Charles E. J. Lang, secretary-treasurer of the Rauch & Lang Carriage Company, of Pittsburgh, is starting for an extended tour around the world. He will visit all the big vehicle-manufacturing plants across the water.

H. F. Fulton, who has been with the Citizens' Motor Car Company, Cincinnati, for a number of years, has severed his connection with that company and will be in the future identified with the Charles Hanauer Auto Company, having in his charge the line of Pierce cars.

The Hoffman Automobile Company has opened a garage at Bedford, Pa. This company has been in business six years, with main offices at Meyersdale, Pa. The Bedford plant will be in charge of C. J. Rowe, of Meyersdale, and H. W. Cunard, of Everett, Pa., and will handle the Maxwell, Columbia and Stoddard-Dayton cars.

Work on the new building which the B. F. Goodrich Tire Company is having erected in Race street, south of Twelfth, Cincinnati, is progressing. It will be two stories in height, of brick, and will cost about $20,000. The interior is to be handsomely finished. J. B. Blake, new manager of the company's branch here, arrived from Detroit recently.

The Pittsburgh-Chalmers Company has been organized, with Ralph G. Kennedy as manager, to handle the Chalmers line in that city. It will be located on Negley avenue near Centre. Mr. Kennedy has been in the automobile business in Pittsburgh 15 years, and was for a long time manager of the local branch of the Morgan-Wright Lumber Company.

The contract between the Cadillac company and Alvan T. Fuller as its Boston agent expired a few days ago and Alfred Measure who recently formed the Cadillac Automobile Company of Boston to handle this car took full charge of the agency. He has a salesroom on Boylston street, and Louis J. Sackett, who had charge of the Cadillac department for Mr. Fuller, has joined the new concern. A section of the Motor Mart has been secured for a repair department.

Accessories Occupy a Prominent Place

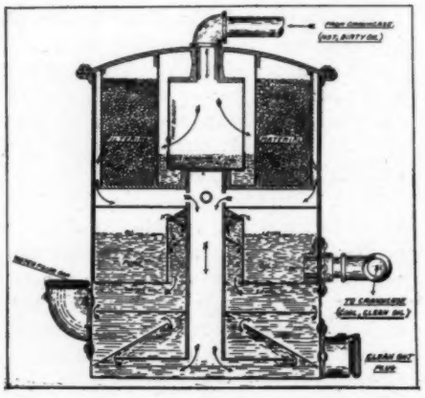
AN AUTOMATIC OIL CLEANSER AND COOLER

The importance of proper lubrication to the life of the motor and to the continued rotundity of the pocketbook is, or should be, appreciated by every motorist. Even the best of oils, after being in use in a crankcase for some time, becomes hot, dirty and gritty; dust is taken in through the "breathers," remnants of core sand from the castings, and carbon, which leaks past the cylinders, collect in relatively large quantities until the oil becomes, in a measure, a grinding compound that cannot fail to act deleteriously on the surfaces it is designed to lubricate. Hot oil, in addition to the readiness with which it leaks through bearings, does not possess the lubricating qualities of cool, heavy oil, which increases the compression, and, therefore, the power.

A system of automatically filtering and cooling the lubricating oil of automobile engines has been designed and patented by H. F. Maranville, a pioneer in this line of work. It is absolutely meddler-proof, and requires no more attention than the radiator or the gasoline tank. The hot, thin and dirty oil is pumped automatically to a filter placed sufficiently high to secure gravity feed on the return. The oil flows through, first, a cylindrical strainer fitted with a removable sediment pan, then through a cylinder filled with bone black, after which it passes through a single ply of specially woven filtering cloth, and then to the bottom of the filter, rising again through a water compartment, where it is washed and cooled, passing through the water separator into the pure oil reservoir, flowing thence by gravity to the crankcase—repeating this operation continuously as long as the motor is running. A clean-out plug is placed at the bottom of the filter to facilitate the removal of accumulations, while on the opposite side there is a filler where the supply of water may be replenished when necessary.

The principle can be applied to almost any present-day motor by making slight changes in the design and pattern of the crankcase.

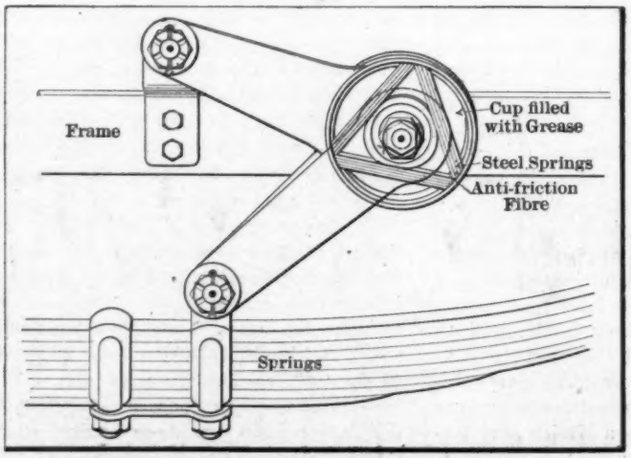
The same device, with a few minor changes necessitated by the use of the flush system of lubrication, has been in successful use for many months in the rail and billet rolling mills of the Indiana Steel Company's works at Gary, Ind. The filter equipment here is, however, on an immense scale, being designed to cleanse 20,000 gallons of lubricating oil every 24 hours.



The H-F-M automatic oil filter and cooler

AN EFFECTIVE SHOCK ABSORBER

In the accompanying illustration is shown the Connecticut Shock Absorber, manufactured by the company of the same name at its factory in Meriden, Conn. The working parts of this device consist of a three-face cam working between three sets of springs of suitable tension to give the necessary resistance for the different weights of cars. These springs are located in a triangular position inside the retaining shell or cup with a piece of special bone fiber inserted between the face of the cam and the spring, so as to eliminate any possible wear. The case is packed with non-fluid oil, which surrounds the cam and springs, keeping them well lubricated at all times. The case is made grease-tight, and it is therefore impossible for the grease to leak out, or for water or dirt to get in.



The Connecticut Shock Absorber in position

The triangular arrangement of the springs and cam insures the placing of the strain on the cams, the bearings for the cam hubs in the shell of the shock absorber receiving practically no wear at all.

To insure proper adjustment of these absorbers they are provided with a serrated disk in order to secure the proper distance between the arms to obtain the neutral position.

During normal movement the absorber does not exert a braking effect, the springs not being brought into action until there is an excessive up-and-down movement of the car body, when the cam rides on the springs, exerting a braking effect and holding the body where it belongs. An added advantage is that in passing over smooth roads the device allows the full flexibility of the springs.

A HIGH-CLASS, POWERFUL TOOL

The pipe wrench here shown is made by the Brosnihan Wrench Company, 31 Hermon street, Worcester, Mass. The movable wedge or sleeve jaw is held against a pipe by a spring, and, grasping it instantly on the downward movement of the handle, does away with all lost motion. The jaws are made of hardened tool steel, tempered in oil.

The Brosnihan pipe wrench

BALZER LICENSE PLATE HOLDER

This device is of very great convenience when passing from one State to another, for the plate can be removed and another put in its place by simply lifting a spring. It also holds the plate so it will not swing, which is an important feature, as many States now enforce this regulation.

This holder is so arranged that the rays of the white light from the rear lamp fall on the number plate. It is attached by removing the rear lamp and placing the socket of the license holder on the lamp bracket, already on the car; the lamp is then placed on a bracket provided on one end of the license plate holder. The other end of the spring which holds the plate down keeps the lamp on the bracket. The Gus Balzer Company, Inc., is located at 1777 Broadway, New York.

Rear view of Balzer license plate holder